MODERN PLASTICS

DECEMBER 1948

WHEN Durez phenolic plastics are described as unsurpassed in versatility, this means the manufacturer of electrical equipment and appliances can count on members of this plastics group to fit *his* special needs.

Even within this one field, Durez offers a wide latitude of characteristics. Easy moldability can be had in a lower power factor material for high-frequency parts. Another retains high dielectric strength at elevated temperatures. Still another has excellent electrical properties closely controlled . . . a type widely used for general purposes. All without sacrifice of impact strength or surface luster!

Whenever you are seeking production speed and economy, along with improved performance or appearance in your product . . . or both . . . consider Durez. With our enlarged plant capacity and perfected quality control, we have much to offer you. "Durez Plastics News", which shows each month what other manufacturers are accomplishing with Durez, is available for the asking.

Durez Plastics & Chemicals, Inc., 1212 Walck Rd., N. Tonawanda, N. Y. *Export Agents: Omni Products Corp., 460 Fourth Avenue, New York 16, N. Y.*

NO "SPILLING" through molded Durez when you

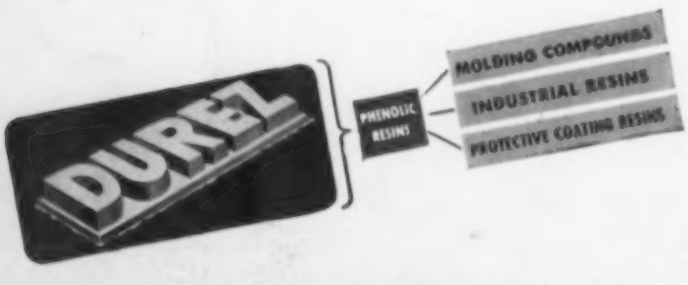
"Pass the Juice"

TRANSFORMER TAP CHANGER. High dielectric strength of the Durez phenolic compound enables these Allis-Chalmers devices to operate at a voltage differential of 15,000 volts at about 50 amps., single phase. Mechanical strength permits heavy spring loading required for positive point contacts. Durez is immune to the hot oil in which tap changer is submerged.

SIGNAL CONTROL UNIT. Normal properties of electrical Durez are all required here . . . dielectric strength, self-insulation, and non-corrosion. Installed along railway lines, these units also possess mechanical stability under wide ranges of atmosphere and temperature.

DISTRIBUTOR PARTS. Made with a Durez compound having excellent arc-resistance and a very low shrinkage factor, these parts hold multiple metal inserts and withstand great variations in weather and operating conditions. Durez facilitates production, conforms easily to intricate grooves, holes and bosses in the mold.

HIGH FREQUENCY EQUIPMENT. The Valpey Xtalector permits instant changes from one radio transmission frequency to another. Crystal holders are molded of a Durez compound possessing a high dimensional stability and low electrical loss, assuring maintenance of crystal frequency in extremes of temperature and humidity.



PHENOLIC PLASTICS that fit the job

TIME TELLS... *Catalin* SELLS!

There are many plastics, but there is only *one* Catalin — *the gem of plastics!* Down through the years hundreds of new materials have made their appearance, yet within its own sphere Catalin remains supreme. Catalin adapts itself perfectly to modern styling, its color has a natural flowing texture that can only be obtained by the casting process through which it is produced . . . deep, rich, satisfying color that is an intrinsic part of the material . . . unrivalled lustre and brilliance, and a charm of surface that will forever remain radiant and enchanting.

Clocks cased in Catalin become distinguished accessories to gracious living, always exquisitely correct, with a style and beauty as up-to-the-minute as the time on the dial. Book ends, desk and table pieces, and a host of other appointments that add color and charm to the home, when cloaked in Catalin bring an enduring pride in ownership . . . the most commonplace object becomes a treasured possession.

In the field of beauty, the range of Catalin is limitless! For this reason the scope of Catalin continues steadily to increase. Highly developed casting techniques now make it possible for product designers to plan freely in all three dimensions. Tooling costs are low, without recourse to expensive custom mold costs. No other thermosetting material can match its rich flowing color or speed of availability.

With an allure rivalling that of rare and semi-precious stone, Catalin gives your product a *desirability* that will add immeasurably to its sales appeal. A get-together with our service staff will quickly reveal how you can plan *telling selling* with Catalin. Inquiries invited!

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ONE PARK AVENUE • NEW YORK 16, N. Y

CATALIN
THE GEM OF PLASTICS
Catalin

CAST RESINS • LIQUID RESINS • MOLDING COMPOUNDS

MODERN PLASTICS*

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*Reg. U. S. Patent Office.

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BOLTAFLEX is manufactured by Bolta Products Sales, Inc., Lawrence, Mass

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We're telling you about this application of Geon polyvinyl resins because it may give you ideas. Upholstery is only *one* product that has been made better and more economical, longer lasting and more beautiful, thanks to Geon. Realize that Geon can be molded, extruded or used as an impregnant, can be firm or flexible *as you choose*. You call the characteristics you want!

We make no finished products from Geon or any of our other raw materials. However, we are always glad to supply information and to assist in any special problems. Write B. F. Goodrich Chemical Company, Dept. O-12, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

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EDITORIAL

What's Wrong With Plastic Flashlights?

Flashlights are a natural field for plastics. But at the recent hardware show in New York, nearly every exhibitor of flashlights complained of his inability to sell flashlights with plastic cases. "The public won't buy them!" said our informants.

The peculiar thing about this situation is that public utilities equip their service men with plastic flashlights, that nearly all other industries requiring flashlights use those with plastic cases, and that the only current official flashlight specification for the U. S. Army Signal Corps (Specification 17-205) calls for a plastic case.

Since industry and the Army use flashlights with plastic cases, why, then, should the public refuse to accept them? The answer is found in the race for mass markets, when a certain amount of faulty engineering and of poor judgment in the selection of plastics for low priced flashlights left their mark on consumer consciousness. At the same time that high quality plastic flashlights were being produced for industry—where they are subjected to severe service conditions and *have* to be reliable—large quantities of low quality items were being aimed at the low-price field. The public bought . . . and then stopped buying. No matter what went wrong with plastic flashlights—even if one of the metal parts failed to function—plastics got the blame!

It was only natural, then, that popular choice should swing away from plastic flashlights, forcing even those manufacturers who were in a position to mold their own cases to revert to metal by consumer demand.

Here is a market—a huge market—in which plastics have been proved, as witness the industrial and Army acceptance of plastics flashlight cases. Lessons have been learned so far as the low cost units are concerned. Some 26,000,000 flashlights were manufactured in the last pre-war year. This is no small business. Perhaps it calls for a sales job for the raw materials manufacturer and molder to the flashlight producer and, beyond him, to the public.

Most promising outlook on the horizon is the statement of one flashlight manufacturer that he will soon introduce a newly designed ethyl cellulose light and sell it with a lifetime guarantee based largely upon its plastic properties. If his advertising is nation-wide, it won't take long to find out whether the reported consumers' apathy is grounded in an antipathy toward plastics. A little digging into the pros and cons of the manufacture and sales of plastic flashlights might well furnish this industry with some valuable experience.

LAMINATED or MOLDED

INSUROK

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INSUROK is a registered trade-mark of The Richardson Company.

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To our old friends, we offer assurance that past high standards of quality and materials and skilled workmanship will be zealously protected.

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Pre-sterilized . . . soft and pliable, yet strong . . . made of Du Pont polythene

Here's the answer to a mother's prayer . . . an end to baby-bottle drudgery. It's a disposable nursing bottle everyone can afford, made of Du Pont polythene plastic.

Invented by a registered nurse, these bottles collapse as the infant feeds, eliminate back pressure within the bottle. So there's less air for the baby to swallow. Soft, pliable and warm in use, these bottles have been called "the nearest approach to natural feeding." Many pediatricians have approved them.

These "Shellie Disposa-Bottles" are made from polythene extruded as continuous flat, sterile tubing, which is then heat-sealed at intervals to form sections with 4-oz. or 8-oz. capacity. Bottles are cut from the tubing with scissors in the home, then fitted with plastic tops, placed in a rack, filled with formula and nippled. After warming, they're used, then thrown away. These bottles are tough and strong, won't tear or leak. They're made of Du Pont polythene because its unusual combination of properties fits the requirements to a T.

A good idea—plus a Du Pont plastic—is a winning combination for new or improved products. Write today for literature on polythene and other versatile Du Pont plastics. E. I. du Pont de Nemours & Co. (Inc.), Plastics Department, Room 3612, Arlington, N. J.

Shellie Disposa-Bottles, nipples, bottle fittings, rack and bottle expander included in "Shellie Nurser Layette Set," made by Shellmar Products Corp., Mt. Vernon, Ohio.

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(½ actual size) Manufactured by Arpin Products, Inc. Flashlight-battery-operated motor designed to power mechanical toys. The housing is molded of transparent, colored Lumarith® XF. This unique cellulose acetate formulation provides flame and heat resistance hitherto unobtainable in a thermoplastic. Lumarith XF has excellent form retention and resistance to cold flow. Many electrical products molded of Lumarith XF are obtaining Underwriters' Laboratories approval.

they're

Celanese® *Plastics*

*Reg. U. S. Pat. Off.

The holiday season is only the beginning for these quality toys. They're built to last . . . to give many hours, weeks and years of pleasure. That's why each toy is made with a Celanese plastic—a type and formulation to exactly meet the manufacturer's requirements of the application.

To accurately match plastic to product, three separate Celanese formulations are used. Here is emphasis of the fact that good product designing—both servicewise and saleswise—begins with *right* plastic.

The Celanese organization is experienced in matching plastic formulations to product needs. This group of merchandise minded men can give you facts and figures that will be invaluable in your planning. Celanese Corporation of America, Plastics Division, Dept. D-1, 180 Madison Avenue, New York 16, N. Y.

THE PENALTY OF LEADERSHIP

Tupperware

Housewares Award Winner is known and approved by discriminating hostesses in every income bracket.

Measures of congeniality

Red Rooster Cheese Assortment packed in Tupperware Poker Chip Rack.

RED ROOSTER

Frank Ryser Co.
Mayville, Wis.

Red Rooster natural Cheese products, approved by epicures as outstandingly delightful alternates to old-world delicacies, selects a Tupper Product as a most appropriate and congenial merchandising companion.

When American Industry is confronted with the problem of producing an alternate for something suddenly made unavailable, it always has, and always will, come up with something not only the equal of, but often superior to, the parent product.

That superiority is not confined to the product, as such. Instead, the American idea and manner of doing things permeates the entire operation from production through to packaging, and so, doubly qualifies it for a leading position in the most responsive of all markets — the American Market.

It is as fitting as it is inevitable that such leaders in American Industry, in their respective fields, should be attracted to each other in sustaining and maintaining that leadership. And so, again, the products of this organization are found to be congenial with, and contributing to, the well being of another fine product.

As custom molders of national stature and repute, fashioning products of multiple service as well as to special, specific conditions, we again present the thought that an association of our products with others of congeniality, will advance the interests of both.

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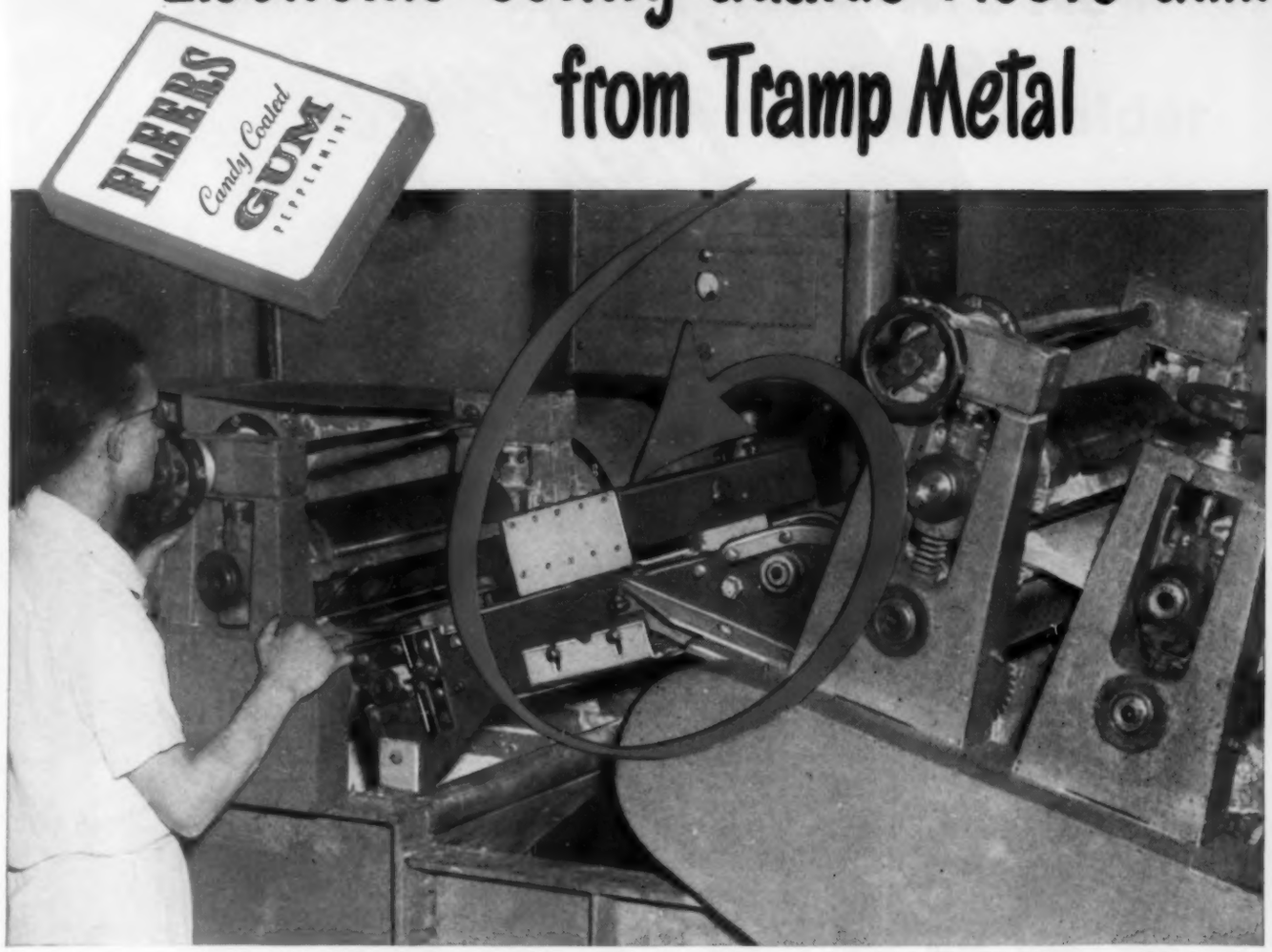
Electronic Sentry Guards Fleers Gum from Tramp Metal



Allis-Chalmers Metal Detectors Provide Constant Product Inspection

THE FRANK H. FLEER CORPORATION, Philadelphia, knows that purity is essential to its product. As a result, A-C Metal Detectors stand watch over its production line . . . protecting against metal contamination . . . assuring customer good will.

Manufacturers of food, plastics, tobacco, rubber, and many other products, use A-C Metal Detectors as insurance against machinery damage and loss of production time. One installation, in a plastic processing plant, paid for itself the *first* day of operation by preventing damage to calender rolls.

Allis-Chalmers Metal Detectors will spot magnetic or non-magnetic particles as small as .039 in. in diameter, regardless of how deeply imbedded they are. If you're interested in their possible application in your plant, contact our representative in your nearby A-C office, or write direct.

**The Metal Detector was developed by RCA Victor. Now, however, RCA's high frequency heating and metal detection equipment has been added to the Allis-Chalmers line. Thus, the combined electronic experience of two great companies is available to serve industry.*

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Company.....

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City.....State.....

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H-P-M's New 4 oz. Injection Molder

Write for H-P-M's new Bulletin 4802 describing 4, 9, 16 and 40 oz. "all-hydraulic" injection machines.

Did you see H-P-M's new 4 oz. Injection Machine molding flower pots at the New York plastics show? If you did, you know its got what it takes! It's no toy! It's built for heavy duty production service. Mold platens are accurately guided on four strain rods. It's fast too . . . up to five cycles per minute! Convenient hand wheels permit quick, independent adjustment of injection and die clamp pressures. Speeds are also easily adjusted.

The full hydraulic die clamp guarantees fast die change-over. There are no complex toggles, links or cams. If you want fast, trouble-free operation, you want H-P-Ms. For molding small "shots", the H-P-M 4 oz. can't be beat! Delivery is prompt. Write for specifications.

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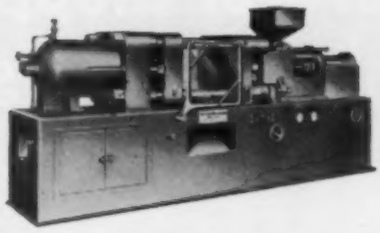
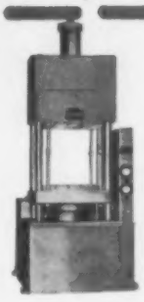


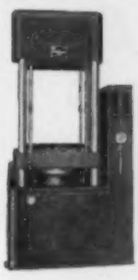
Horizontal Injection Molding Machines 8 to 80 Ounces

Preform Tableting Machines —10 and 100 Tons



Transfer Molding Machines 30 to 1200 Tons

General Purpose Presses 20 to 200 tons



Compression Molding Presses 50 to 1200 Tons

Only WATSON-STILLMAN OFFERS THESE SOLUTIONS TO YOUR MOLDING PROBLEMS:

1 The world's most complete, standard line of hydraulic plastics molding equipment.

2 100 years of experience in building hydraulic machinery.

Only Watson-Stillman can offer you a complete, standard line of equipment that can meet almost every molding need—no matter what method, no matter what plastic material you want to use. And, in addition, Watson-Stillman gives you the benefit of their experience gained through 100 years in building hydraulic machinery. So to get modern production speed and efficiency, ease of operation and maintenance plus the cost advantages of standard design, specify W-S equipment.

The W-S line includes horizontal and vertical injection machines, transfer machines, compression presses, laboratory presses, automatic tableting machines, hobbing presses, record presses and general purpose presses.

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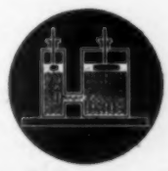

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Vertical Injection Machines.....1, 2 & 4 oz.
Horizontal Injection Machines.....8 to 80 oz.
Compression Molding Machines....50 to 1200 ton
Transfer Molding Machines.....30 to 1200 ton
Tableting Machines.....10 and 100 ton
Laboratory Presses.....10 to 200 ton
Hobbing & Die Sinking Presses....200 to 3000 ton
Preformers • Plasticizers • Laminating and Polishing Presses • Record Presses

Said the careful shopper—
"I want the plastic that will stand boiling water"

It happened in one of the big Pittsburgh department stores. A customer walked up to a table of plastic kitchen ware. The clerk showed her some colorful plastic items . . . but she wouldn't buy. Finally the customer said, "I've heard of a new plastic that will stand boiling water. That's the kind I want."

The clerk was stumped. She didn't know for sure if any of them would stand water that hot.

At this point, a Koppers representative who had overheard the conversation, stepped up.

"Pardon me, ladies," he said, "but I know the plastic you want. It's the new heat-resisting plastic, made by Koppers—Polystyrene P-8." He told the customer how the new plastic stood the test of boiling water for 30 minutes and how it could be safely washed in the automatic home dishwasher . . . and finally that it cost no more than other thermoplastics.

Both the customer and sales clerk were intrigued. Both wanted to know when the new plastic would be available. The answer to that question is . . . *NOW!* Molders can order Koppers Polystyrene P-8 today . . . and the quicker you place your order, the quicker you'll be able to produce the new plastic items your customers have been waiting for.

Here it is— Koppers new heat-resisting POLYSTYRENE P-8

The case of the customer who insists on *heat resisting* plastics is being duplicated in hundreds of stores throughout the country. If your product is one that must be washed or used in hot water, if it must stand the concentrated heat of a radio tube, Koppers New Polystyrene P-8 is the plastic for you.

In repeated tests, products made of P-8 have withstood boiling water continuously for a half hour period—much longer and at higher temperatures than is usual for dishwashing. And in the standard A.S.T.M. heat distortion test, P-8 shows heat resistance 10° higher than the best regularly priced polystyrene previously obtainable.

Costs no more. Koppers Polystyrene P-8 sells at the same price as regular polystyrene. There's no premium to pay—no reason for not switching to this low-cost superior material.

Has better moldability and extrudability. Koppers P-8 has an extremely fast molding cycle. You get more pieces per hour and a higher percentage of perfect pieces. P-8 is a product of reliable uniformity with the same qualities maintained in each shipment. There is less scrap and what scrap there is can be ground up and used again.

Comes crystal clear or in a rainbow of colors. All of Koppers Polystyrenes are first made crystal clear. Each has unlimited color possibilities. Our skillful color-matching technicians can duplicate any color you want in transparents, translucents and opaques . . . pale pastels or brilliant hues . . . snow-white or jet-black. And they can duplicate your color, order after order.

Made by a new and different commercial process. This enables Koppers to offer you a complete line of Polystyrenes—all at the same low cost—all quality controlled in every step of manufacture. Send the coupon for information on all of Koppers Plastics.

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Please send me your new booklet on Koppers Plastics.

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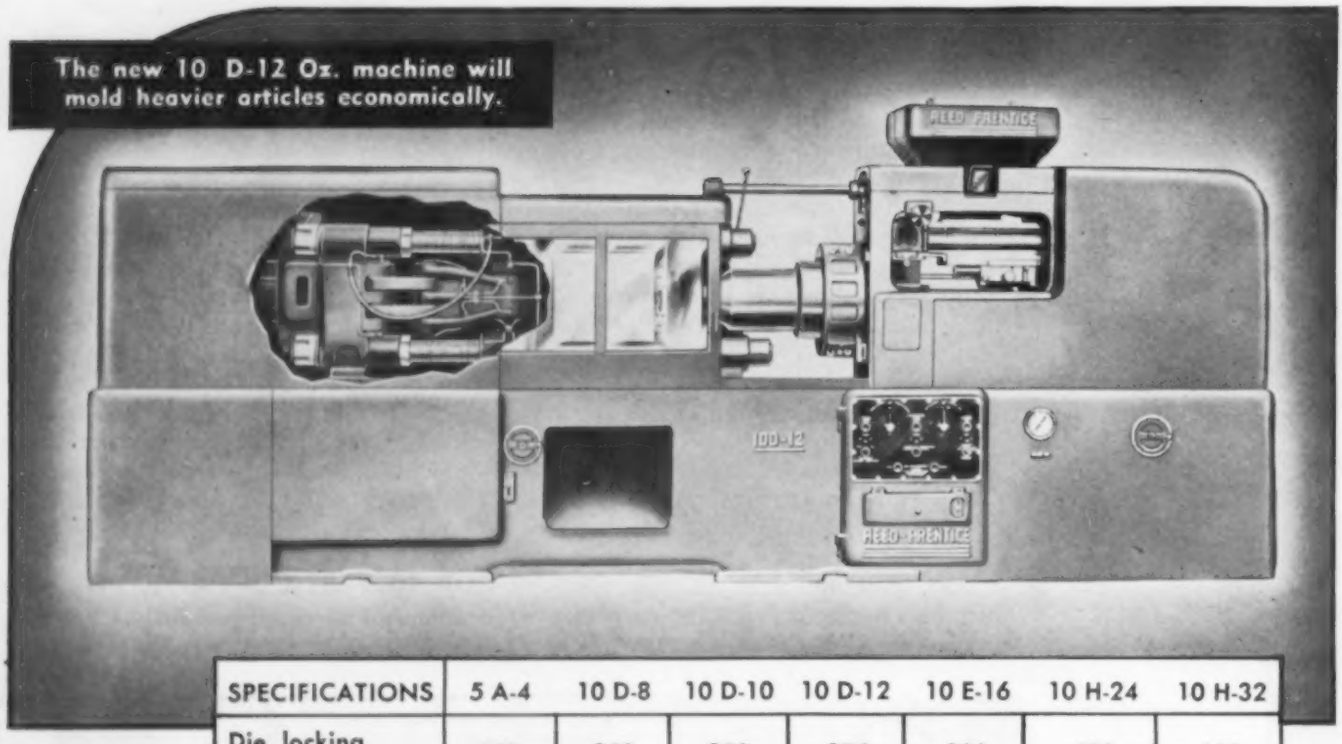
New REED-PRENTICE Injection

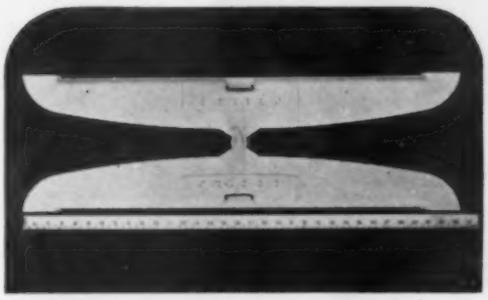
The new 12 Oz. Reed-Prentice Plastic Injection Molding Machine has been especially designed to accommodate molds for articles requiring a machine of this capacity. Extra capacity toggle mechanism and tie rods provide the same dependable construction successfully used on nearly 2,000 machines. The newly developed Reed-Prentice heating cylinder with special alloy steel, chrome plated spreader and solid copper core, assures complete filling of heavy sections without flaws or blemishes. Accurate control of machine time, temperature and pressure results in a versatile, well balanced production. Low in cost for its capacity and performance, the 10D-12 Oz. model has all the important features that establish the leadership of Reed-Prentice machines in the injection molding field.

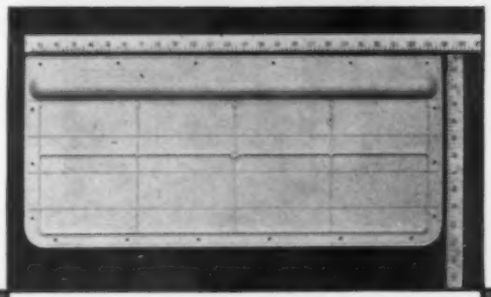


The new 10 D-12 Oz. machine will mold heavier articles economically.

SPECIFICATIONS	5 A-4	10 D-8	10 D-10	10 D-12	10 E-16	10 H-24	10 H-32
Die locking pressure, tons	100	250	250	275	300	600	600
Max. casting area, sq. in.	50	100	125	100	120	210	210
Mold opens	8"	10¼"	10¼"	10¼"	12"	16"	16"
Max. die space	12"	16"	16"	16"	17"	20"	20"
Size: die plates	16 x 21"	21 x 25"	21 x 25"	21 x 25"	25 x 26"	30" x 30"	30" x 30"
Oz. molded per shot (acetate)	4	8	10	12	16	24	32
Pressure psi on material	16,000	20,000	16,000	20,000	23,000	24,500	24,500

10 D-12 oz. and 10 H-32 oz. Machines ADDED TO THE LINE!

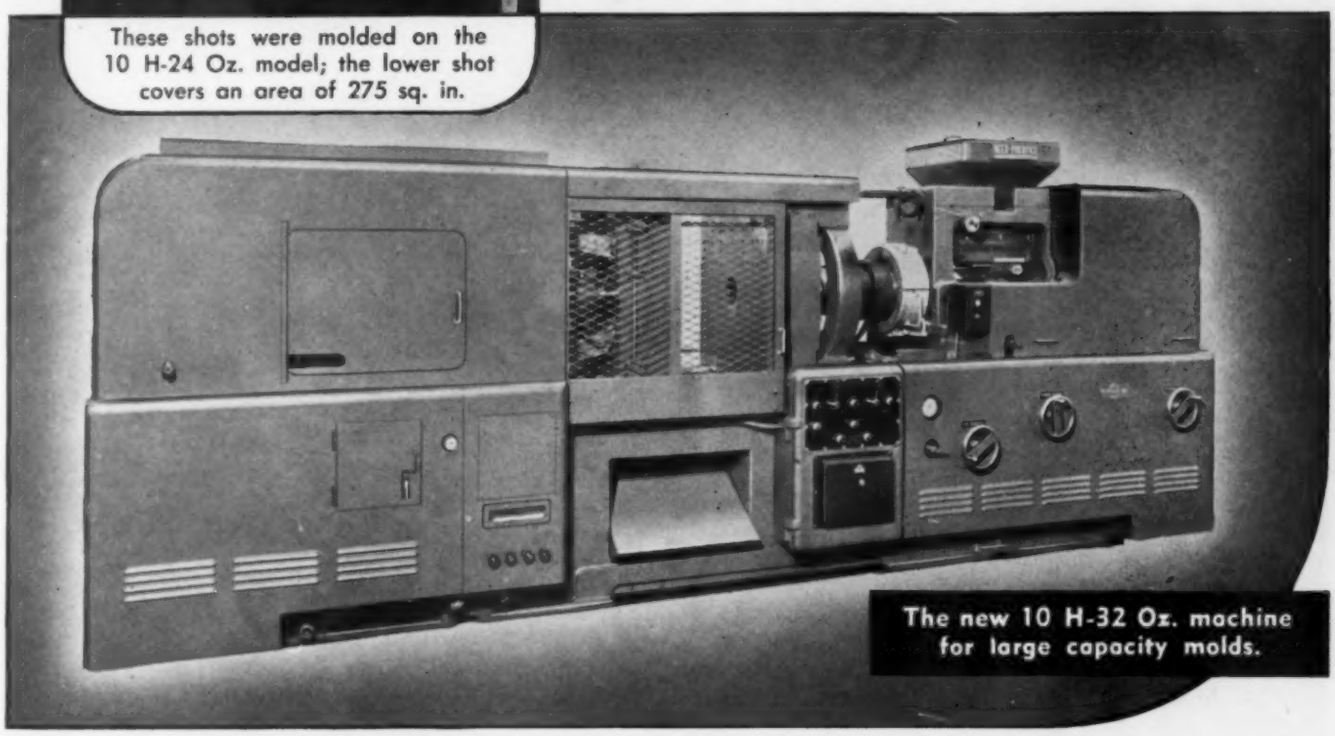




These shots were molded on the 10 H-24 Oz. model; the lower shot covers an area of 275 sq. in.

The new 32 Oz. Reed-Prentice Plastic Injection Molding Machine is designed to fill the needs of molders requiring large mold capacity. A combination of accurate heat control (applied to the material), pressure control (for perfectly filled cavities) and controlled cycling time . . . guarantees uniform results from intricate and wide area molds. The 10H-32 Oz. model accommodates a broad range of work and, like all Reed-Prentice machines, is exceptionally low in maintenance cost.

With the introduction of these two models, Reed-Prentice now offers the molder a choice of machine capacities that covers every injection molding requirement. All machines are available for prompt delivery. Write Dept. D for more detailed information.



The new 10 H-32 Oz. machine for large capacity molds.

THE WORLD'S LARGEST MANUFACTURERS OF INJECTION MOLDING MACHINES

INJECTION MACHINES

REED-PRENTICE CORP.

WORCESTER MASS., U.S.A.

NEW YORK 75 West Street

CLEVELAND 1213 West 3rd Street

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The ROCKFORD HY-JECTOR introduced in 1947 as an 8 oz. machine

is now built in 1948 with a 16 oz. capacity

The 3 in 1 THERMOSETTING Machine that Automatically

- *Makes its own preforms*
- *Preheats them dialectrically*
- *Molds with Injection machine speed*

provides 100% greater molding capacity at a machine cost of only 9% more

Here is the new, larger ROCKFORD. You get all the superior features that made the original 8 oz. machine such a sensation . . . the high speed automatic cycle of preforming, preheating and molding that enables molders to turn out up to four times as many precision pieces per hour as are obtainable by standard compression methods.

Machine capacity is double. And, due to the double cycling in tabletting and preheating preforms, operating speeds are only very slightly less than on the 8 oz. Hy-Jector. Thus, actual hourly piece production is almost double . . . *with only one operator!*

The new 16 oz. ROCKFORD, at a price increase of less than 9% over the 8 oz. machine, offers economies that cannot be ignored by molders competing price-wise for new business.

Ask about our 16 mm. silent, full color movie showing ROCKFORD operation . . . now available for showing without charge to qualified technical groups.

ROCKFORD MACHINE TOOL CO.
ROCKFORD, ILLINOIS

ROCKFORD HY-JECTOR

DESIGNED AND BUILT BY
ROCKFORD MACHINE TOOL CO...
MANUFACTURERS OF Hy-Draulic
SHAPERS • PLANERS • SLOTTERS
SHAPER-PLANERS FOR METALWORKING


Ads like this one, in the December issue of Good Housekeeping, are selling millions of potential customers for your products — when you make them with Resproid.
A Sunbeam Turned
into a Lovely New Material
. . . for You!
The lovely, gay colors you'll find in Respreid could have come straight from a sunbeam. And they're just that impervious to dirt.
You can clean Resproid in seconds with just a damp cloth. Guaranteed by Good Housekeeping, Resproid is practically indestructible in everyday use. It resists cracking, fading, scuffing and abrasion — perspiration, most acids, alkalies and alcohol.
Leading manufacturers are using Resproid now, in its many styles and weights, to make a wide range of lovely and useful things for you. Things like beautiful furniture upholstery that brings new color into your home—handbags and luggage in natural leather and reptile grains as well as patent finishes—gay shower curtains, cottage sets, aprons, waterproof garment — an almost endless list of products Resproid makes both prettier and more practical than ever before.
Look for these things made of Resproid next time you go shopping. You'll find either the regular pink and black Resproid tag or the yellow and black Fire-Resistant type Resproid tag identifying them in leading stores everywhere. And you'll find these tags stand for a combination of beauty and durability you have wanted for a long time. Respro Inc., Cranston 10, R. I.
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—or you'll miss one of the smartest new applications of

PLYON*

—the versatile plastic that combines impact strength to withstand the toughest kind of wear, plus "beauty appeal" that means SALES in transportation.

The Kenworth Motor Truck Corp. of Seattle, Washington, is using PLYON as the interior lining in their ultra-modern buses because PLYON combines . . .

Permanent Color	Ease of Installation
Dimensional Stability	Fire Resistance
Light Weight	Ease of Cleaning

"PLYON" is obtainable in various resin formulations and filler constructions which may consist of Nylon, Fibreglas, Cotton and Paper, singly or in combination. The versatility of our low pressure laminating equipment provides extreme latitude, ranging from complete rigidity to complete flexibility of the end product.

17 years' experience as leaders and pioneers in plastic manufacturing and ACRYLIC fabrication qualifies SWEDLOW to render valuable aid in practical applications of these materials.

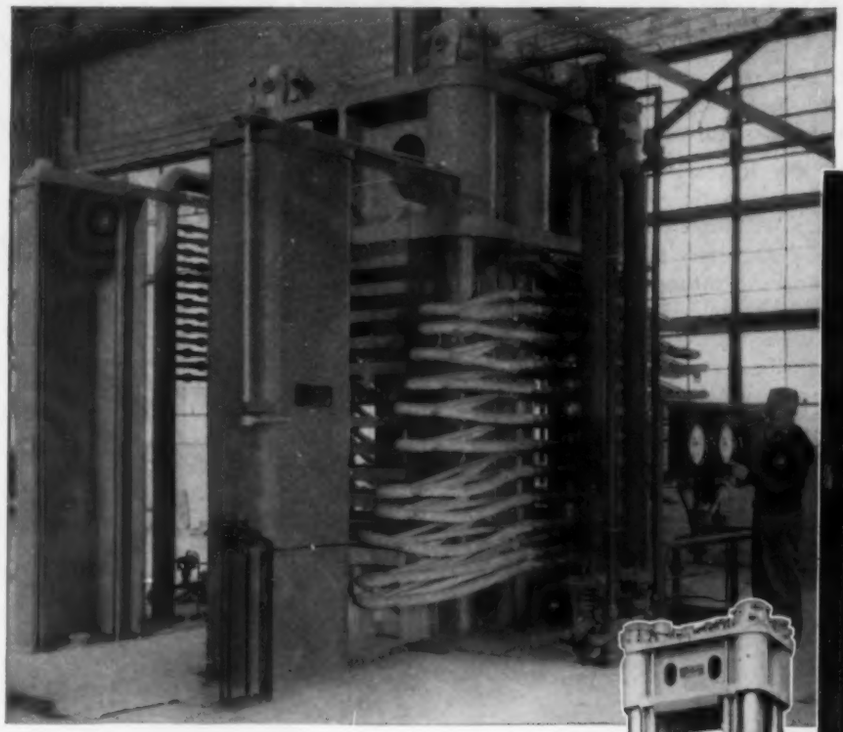
Call or write us your requirements. We'll be glad to help you solve your problems with PLYON or ACRYLIC.

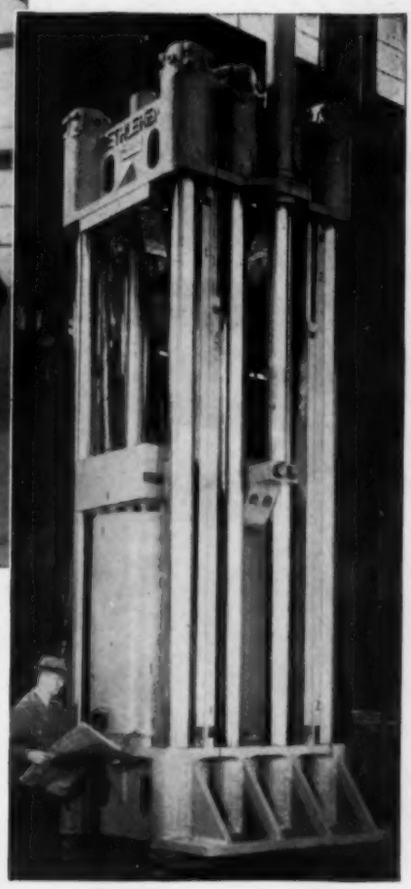
Swedlow
PLASTICS CO.

3757 WILSHIRE BOULEVARD • LOS ANGELES 5, CALIFORNIA

HYDRAULIC PRESSES

Hot-plate and molding types in large, medium, and small sizes





Bethlehem will build any size of press needed in the plastics industry, following specifications supplied by the customer. We can furnish the press alone, or with a self-contained or separate hydraulic power system.

For a smoothly-planned, well-executed job, see Bethlehem. One of our engineers—a specialist in this work—will gladly discuss the preliminaries with you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
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BETHLEHEM STEEL

BETHLEHEM
Custom-Built
HYDRAULIC · PRESSES

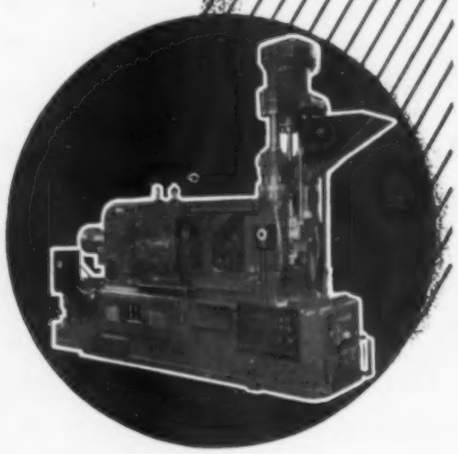
FOR
PLASTICS • WALLBOARD • FIBER BOARD
VULCANIZING • METAL-FORMING

The Cleverest Toys are Molded on **LESTERS**

We have gone beyond the stage of making claims for Lester Injection Molding Machines. We need only let you examine what our customers tell us about the machines.

The tub for the toy washing machine illustrated here, is molded in two halves in a four cavity mold on a Lester Injection Molding Machine. The manufacturer, Precision Specialties, Inc. of Los Angeles, tells us, in part, "The shot weighs between 10 and 11 ounces . . . and we are able to mold it on a 26 second cycle. The percentage of rejects is under 1%—practically negligible. We are very pleased with the performance of the Lester on this operation, . . . it outperforms any other type of machine for this particular part."

Time and again, we get this response from our customers, molders of all types of thermo plastic materials for every field. Examine its features and its record —you'll find the Lester best for your purpose.



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FOREIGN

Toronto, Canada . . Modern Tool Works, Ltd.
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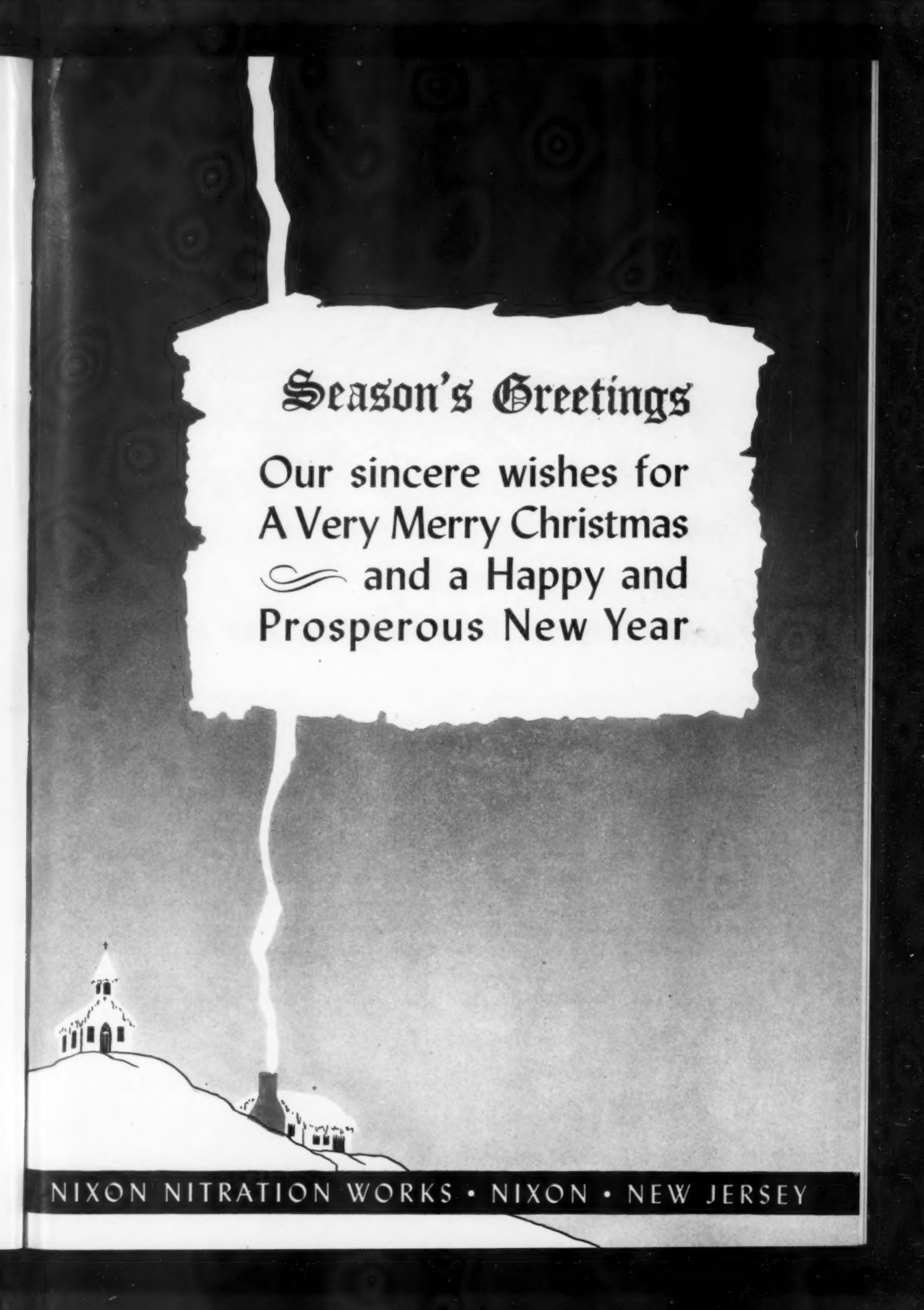
LESTER INJECTION MOLDING MACHINES

Distributed by Lester-Phoenix, Inc.
2621 Church Avenue **Cleveland, Ohio**


Season's Greetings
Our sincere wishes for
A Very Merry Christmas
and a Happy and
Prosperous New Year
NIXON NITRATION WORKS • NIXON • NEW JERSEY

A Melonomonophobiac IN THE MAKING!

Pardon the six-dollar word! The Greeks, who usually come up with a word for practically everything, *didn't* have a word for "one who has a fear of green apples" . . . so *we* molded a word (we mold practically anything, y'know!).

There's a moral coming around the corner, we warn you . . . But, after you had such an unfortunate experience like the above, did *you* stop eating apples for good . . . or did it teach you to be more selective about fruit? Or . . . did you ever try cutting wood with a cheap saw . . . and decide to give up sawing for all time . . . or did you buy a saw that keeps its edge? (Here it comes!) Or have you ever used the wrong plastic . . . and been stuck with it? (See what we're adroitly getting at . . . hmmmm?) In plain language . . . apples, saws and plastics are swell *if* they're the right kind, the right quality and used correctly.

You'll have to discuss apples and saws with your fruiterer and hardware store . . . but we'll be dee-lighted to see that you get the *right* plastic for the molded plastic parts you want, and then we'll mold them right too. Yessir . . . if you happen to be a plasticophobiac, we *guarantee* to cure you for keeps of this awful ailment.

Boonton

THE BOONTON MOLDING COMPANY

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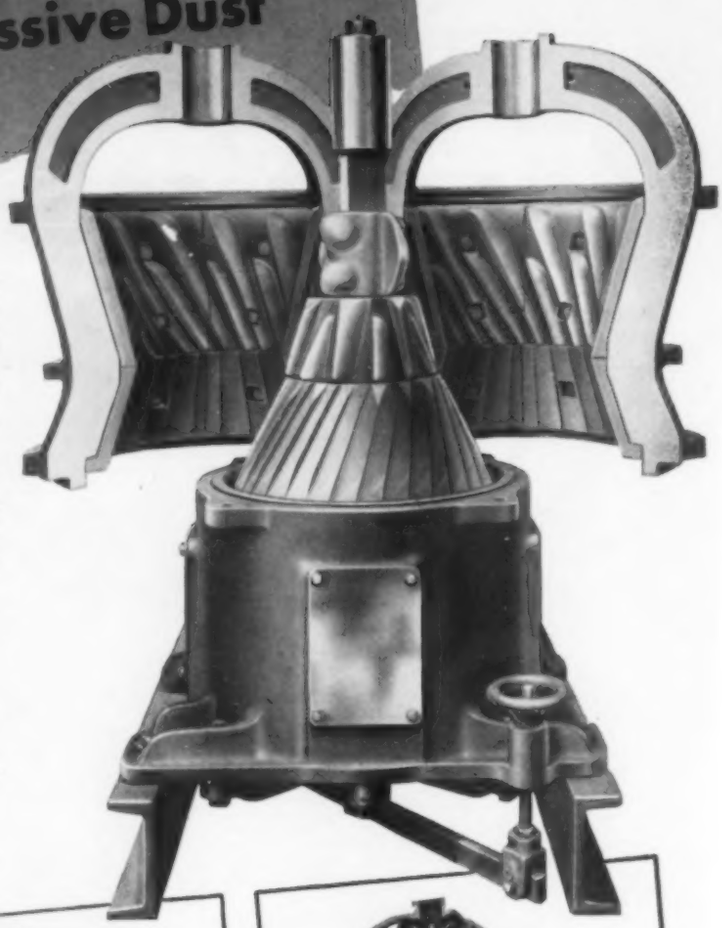
MOLDERS OF MOST PLASTICS BY MOST METHODS

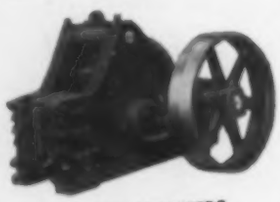
STURTEVANT

Rotary Fine Crushers

Provide Granular Products Without Excessive Dust



These fast, highly efficient crushers are designed to crush or granulate soft and moderately hard substances to fine even sizes without large amount of dust. They effectively handle materials up to and including the hardness of the softer limestone or cement clinker. The fineness of product is regulated by a hand-wheel. They produce a dependable quality of output from one inch to a quarter inch. Capacity ranges are available from one to 30 tons per hour depending on size of machine. Open door accessibility allows entire crushing area to be exposed for quick, easy cleaning. Write for information.



JAW CRUSHERS

for coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.

RING-ROLL MILLS

for medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operate in closed circuit with Screen or Air Separator. Open door accessibility. No scrapers, plows, pushers, or shields.

CRUSHING ROLLS

for granulation, coarse or fine, hard or soft materials. Precision and automatic adjustments. Crushing shocks balanced. For dry or wet reduction. Sizes 8x5 to 38x20. Roller or Plain bearings. The standard for abrasives.

STURTEVANT MILL COMPANY

110 Clayton Street, Boston 22, Mass.

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INTERLAKE *Resineering*

—the functional engineering of a resin to meet the specific requirements of each job

ANALYSIS
of your job.

DEVELOPMENT
of a resin for your specific application.

TESTING
this resin in your plant, working with your men.

CONTROLLED PRODUCTION
so that each shipment of the resin is uniform.

Results....

1. A uniform, dependable resin
2. Improved quality of product
3. Fewer rejects and production delays
4. A resin that costs no more

INTERLAKE CHEMICAL Corporation

• PRODUCTS FROM COAL •

Let us tell you how Interlake *Resineering* has proved itself by successfully serving many leading resin users.

THE INTERLAKE CHEMICAL CORPORATION, Executive Offices: Union Commerce Bldg., Cleveland 14, Ohio; Branch Offices: 10 Post Office Square, Boston, Mass.; 332 S. Michigan Ave., Chicago, Ill.; 1855 Industrial St., Los Angeles, Calif.; Smith Tower, Seattle, Wash.

WHICH PFIZER Plasticizers ARE COMPATIBLE WITH WHAT Resins?

Compatibility of Pfizer Citric Acid Esters

	Triethyl Citrate	Tributyl Citrate	Acetyl Triethyl Citrate	Acetyl Tributyl Citrate
Cellulose Acetate	C	P	C	P
Cellulose Acetate Butyrate	C	P	C	P
Cellulose Nitrate	C	C	C	C
Ethyl Cellulose	C	C	C	C
Polystyrene	P	C	C	C
Vinyl Acetate	C	C	C	C
Vinyl Chloride	C	C	C	C
Vinyl Chloride Acetate	C	C	C	C
Vinyl Butyral	C	C	C	C

P — Partially Compatible
C — Compatible

QUALITY AND AVAILABILITY

No matter which of these four Pfizer esters you use as a plasticizer, you can be sure of its uniform high quality and service characteristics. All are currently available in quantities to meet your needs. For further information or samples, please write Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y.; 211 E. North Water St., Chicago 11, Ill.; 605 Third St., San Francisco 7, Calif.

PFIZER

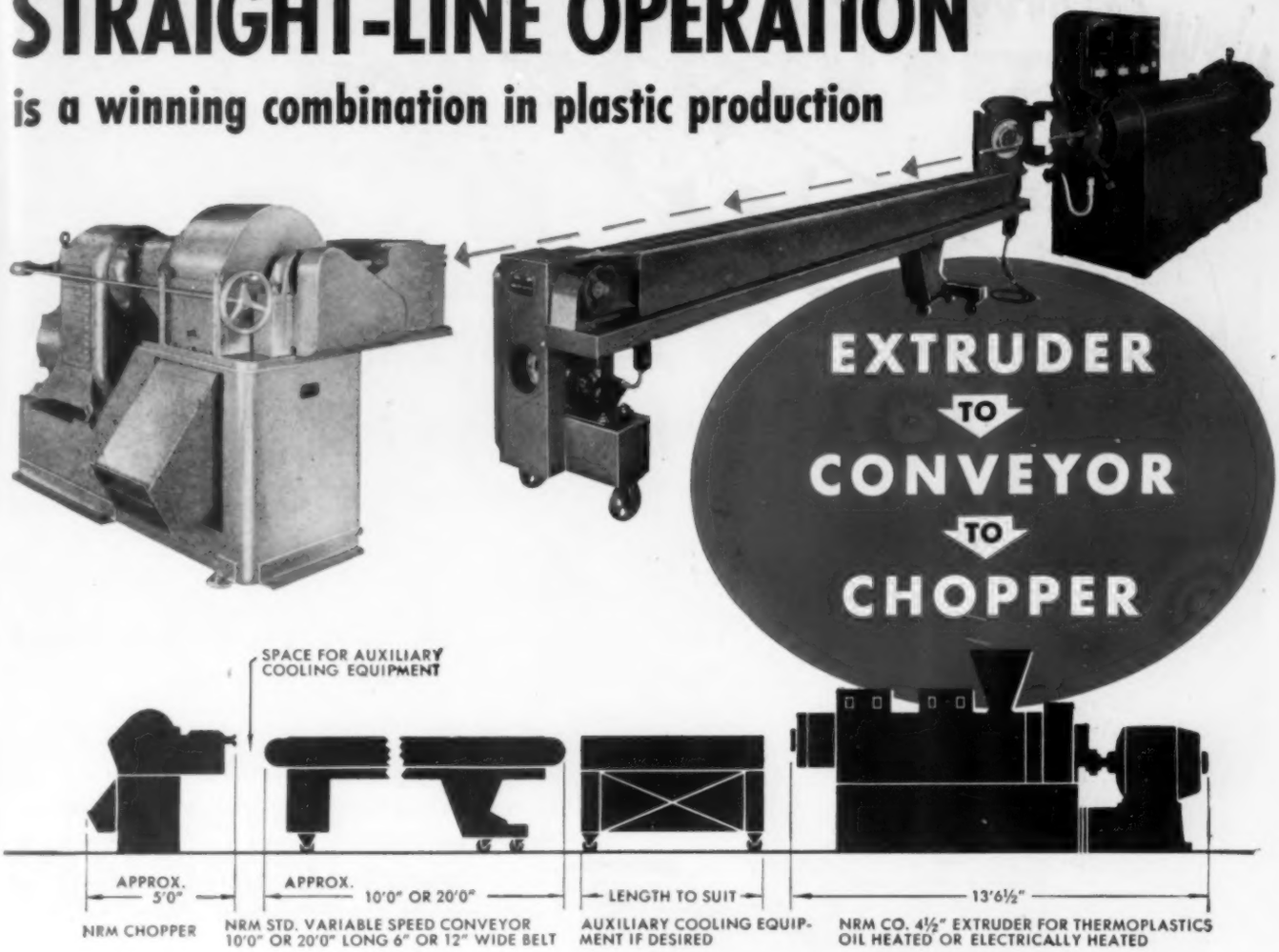
PFIZER QUALITY

Manufacturing Chemists Since 1849

This NRM triple-unit TEAM used in

STRAIGHT-LINE OPERATION

is a winning combination in plastic production



TAKE a straight-line short-cut to greater plastics profits!

These 3 NRM Units—4½" Extruder, Universal Type Takeoff Conveyor and Heavy Duty Chopper—combined for straight-line production—can put *your* plastic processing on a more profitable basis.

The integrated operation of these NRM machines, functioning as a single unit, provides a smooth, continuous flow of thermoplastic materials from basic stock to finished pellets of *pre-determined* size and shape.

The many outstanding features of each NRM unit in this synchronized team assure maximum production of exceptionally clean, uniformly mixed stock, processed under proper temperature control and discharged in the form of plastic pellets for molding or extrusion compounds. Several NRM 3 unit combinations are available for large or small production requirements. Write today for detailed data on NRM straight-line operation.

NATIONAL RUBBER MACHINERY CO.
Plastics Machinery Division
Akron 8, Ohio
Gentlemen.
Please send me your complete catalog on Plastics Extrusion Equipment.
Name .....
Address .....
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NRM

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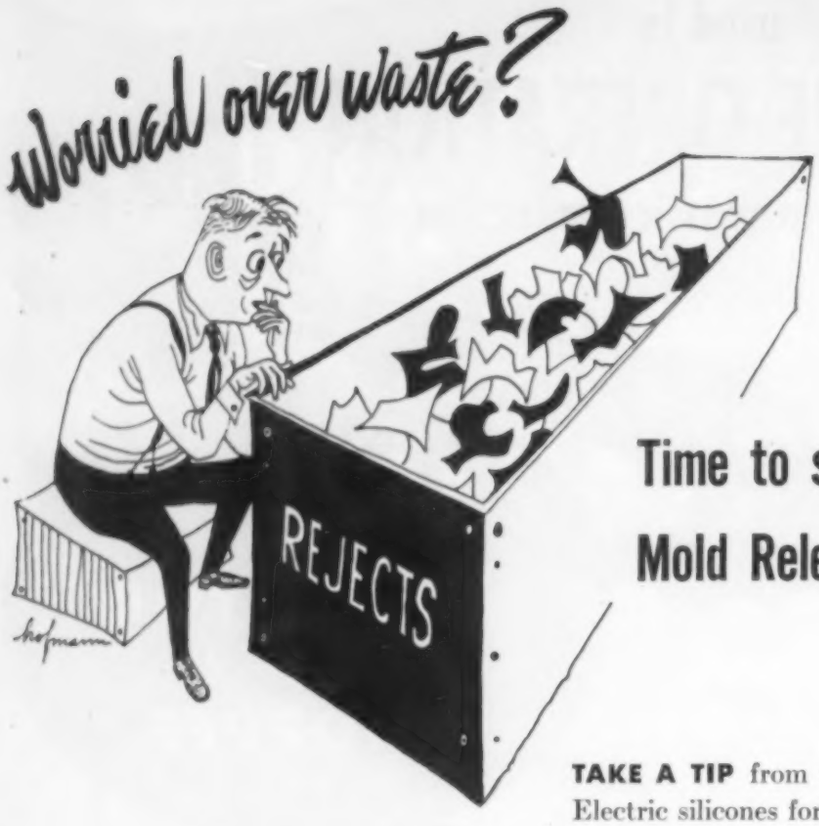
Plastics MACHINERY DIVISION

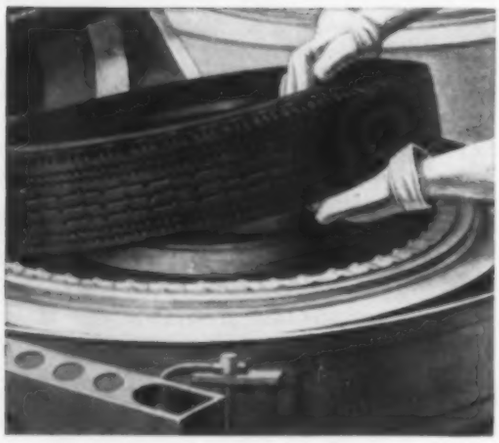
EXPORT DISTRIBUTORS: OMNI PRODUCTS CORPORATION, 460 FOURTH AVE., NEW YORK 16, N. Y.



Time to switch to G-E Silicone Mold Release Agents!

TAKE A TIP from rubber tire molders. Switch to General Electric silicones for your mold release agents.

Many tire manufacturers have found that G-E silicone oils and water-diluted emulsions permit the rubber to flow more smoothly within molds than is possible with conventional release agents. They report that this results in better-looking tires, less wear and tear on molds and pressure bags, increased production.



Whether you are in the rubber or plastics molding business, G-E silicone mold release agents can help you make a better product...decrease mold down time... minimize reject losses.

Order General Electric silicone oil #9981 LTNV-70 (low viscosity), #81092 (high viscosity), silicone emulsion #81024 (75% silicone) or #81099 (35% silicone) in any quantity from pints to drums. Quick delivery. Write for more details. Chemical Department, General Electric Company, Pittsfield, Massachusetts.

Please address inquiries about G-E silicone oils to Resin and Insulation Materials Division, Chemical Department, General Electric Co., Schenectady 5, N. Y.

SILICONES for Industry

GENERAL ELECTRIC

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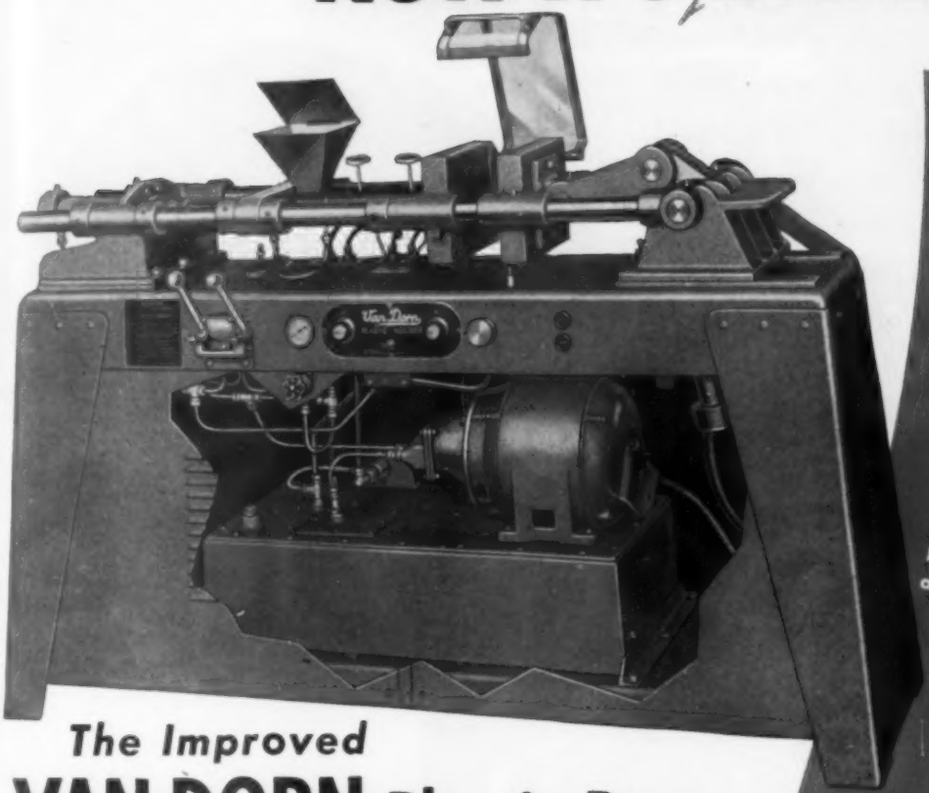
Always Outstanding

NOW IT'S EVEN BETTER!



Spreader added to heating cylinder cuts heating cycles up to 50%.

Hard Chrome Plating of interior of cylinder cuts resistance to flow of materials, protects against corrosive compounds.

New Relief Valve—set at 1500 P.S.I.—insures maximum clamping pressure always, permits separate adjustment of injection pressure.

New Needle Valve increases gage life, by allowing gage to be shut off except for periodic checks on pressure.

SAME LOW PRICE!!

The Improved VAN DORN Plastic Press

With the addition of these four new features, this Van Dorn Press is *unequalled* in the 1 oz.-capacity class for molding practically all thermoplastics including nylon. This remarkably economical press—

Costs under $2000

Operates 8 hours for under a dollar

Uses less expensive molds

Can be set up by one man in 20 minutes

This Van Dorn Injection Press is unexcelled for profitable production of small parts, and "pilot" or experimental runs on bigger jobs.

We make mold bases for Van Dorn Presses.

THE *Van Dorn* IRON WORKS CO.

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FREE BULLETIN tells all the facts. *Write for it.*

What made this baby grow so fast?

A comparatively new addition to the American industrial family . . . the plastics industry has already come of age. A giant in size, its products touch the lives of everyone, every day, in literally thousands of ways. Barrett is proud to be one of the chemical suppliers who have made this spectacular growth possible. We have made available increasing quantities of chemicals—dibutyl phthalate, dicyclohexyl phthalate, Plasticizer 50-B, phthalic anhydride, phenols, cresols, CUMAR* resins, Resin S, and others—used in the manufacture of a great variety of plastics. Helping other businesses to prosper has made Barrett "one of America's great basic businesses."

BARRETT PLASTICIZERS

DIBUTYL PHTHALATE—A clear, high-boiling, water-white liquid widely used as a modifying agent and plasticizer for synthetic elastomers and natural and synthetic resins.

DICYCLOHEXYL PHTHALATE—A white, granular plasticizer used in supported and unsupported vinyl films. Imparts increased toughness and tear strength and materially aids processing.

PLASTICIZER 50-B—A new plasticizer of particular value in compounding and processing of supported and unsupported vinyl films and extruded products, it helps to eliminate calendering and extruding difficulties, and aids in providing a soft hand, high gloss and clarity.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
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Barrett*

*Reg. U. S. Pat. Off.

Another tough job licked with

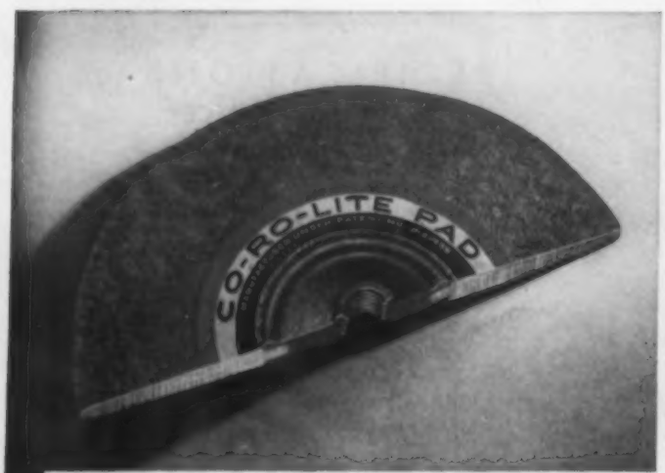
CO-RO-LITE

the rope fibre plastic

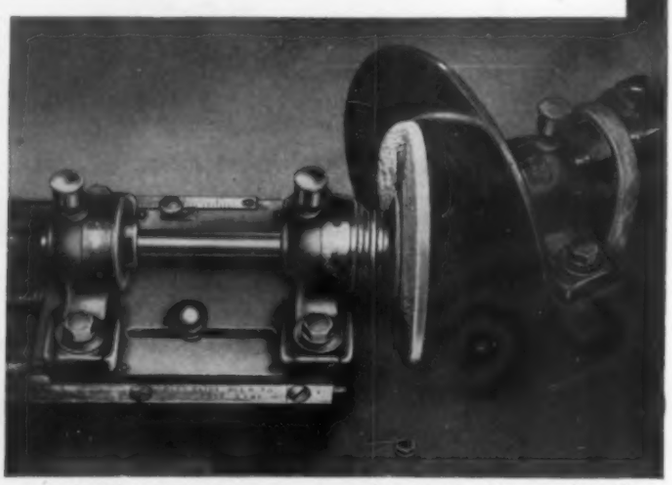
Readily Pre-formed and Molded

INTO COMPOUND CURVES
DEEP DRAWS
ANGLES
CHANNELS
LARGE SHELLS

● Dense, hard Co-Ro-Lite forms the hub of this sanding pad, while flexible Co-Ro-Lite forms the pad. Typical of the adaptability of this Rope Fibre Plastic to industrial use.



● Cross-sectional view shows the successful joining of two densities of Co-Ro-Lite.



● This Torture-Test proves that Co-Ro-Lite pads will outwear old style sanding pads.

CO-RO-LITE is equally effective with fluid pressure or high pressure. Long, tough interlocking rope fibres reinforce all sections of the molded unit, imparting great impact, flexural, compressive, and tensile strength in a range of densities comparable to wood.

CO-RO-LITE: Rope Fibres impregnated with thermo-responsive resin: Product and Process Patented. Patents No. 2,249,888 and No. 2,372,433; other patents pending.

ALLIED PRODUCTS DIVISION

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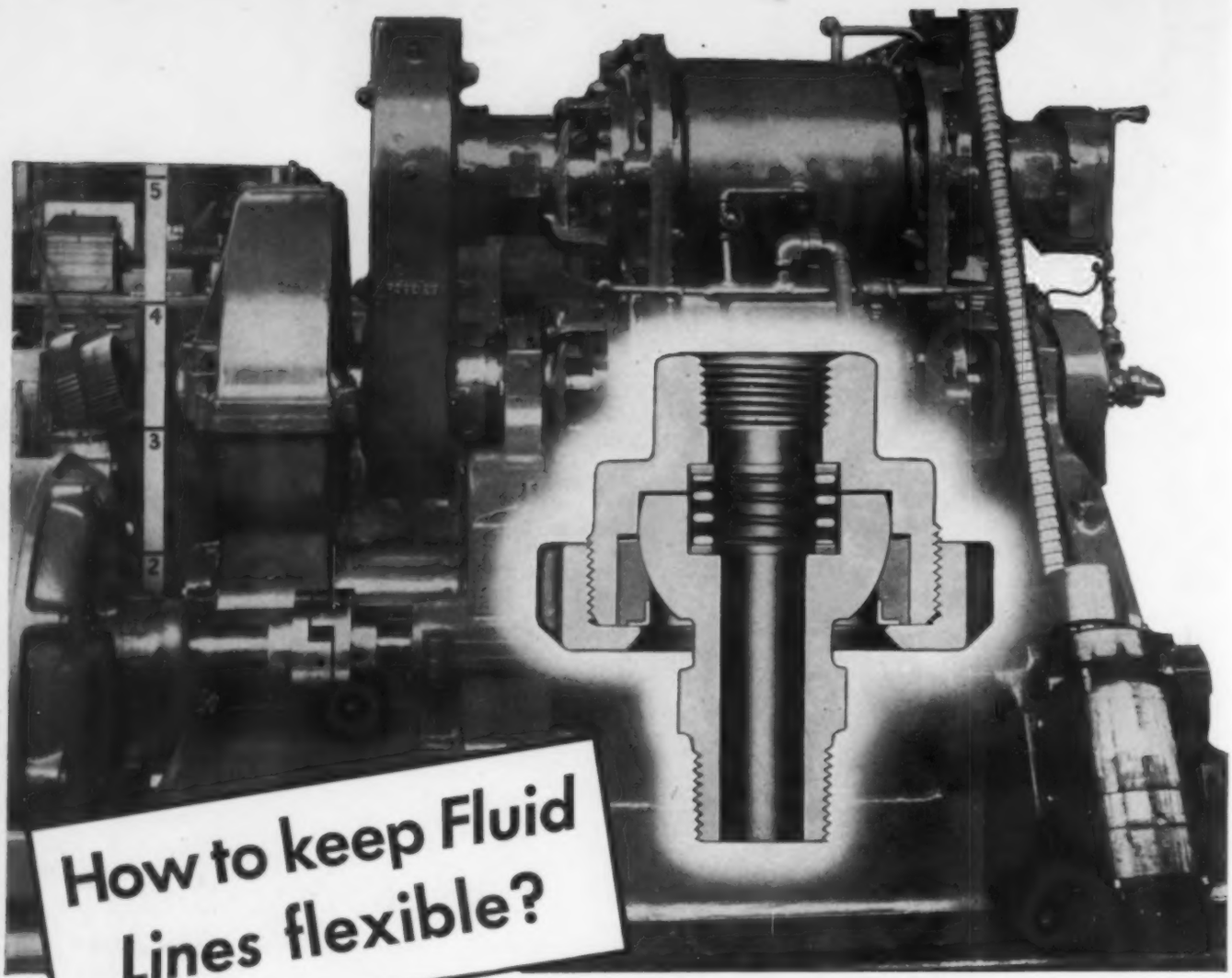
Canadian Licensee: Canadian Bridge Engineering Co., Ltd.
Box 157, Walkerville, Ontario, Canada



THIS MACHINE USES BARCO JOINTS

This mixer, designed for the baking and rubber industries, is equipped with Barco Swivel Joints that permit easy tilting for unloading.

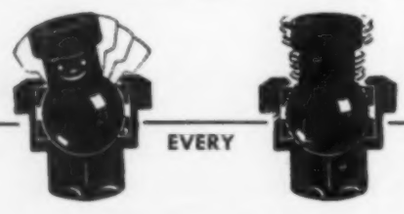
Providing such flexibility is no unusual job for Barco Joints. They perform many services on a wide variety of machines and fluid conveying systems, both simple and complex. Barco Joints are made to withstand hydraulic pressures of 2500 pounds. They are unique in their ability to absorb shock and misalignment strains, due to a combination ball and swivel action.

Throughout the last 33 years, Barco engineers have solved thousands of problems relating to flexible connections. Their experience and technical skill are at your disposal. Write Barco Manufacturing Co., 1809 Winnemac Ave., Chicago 40, Ill. In Canada: The Holden Co., Ltd., Montreal, Canada.

BARCO ***FLEXIBLE JOINTS***

Not just a swivel joint ...but a combination of a swivel and ball joint with rotary motion and responsive movement through every angle.

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY



"MOVE IN EVERY DIRECTION"

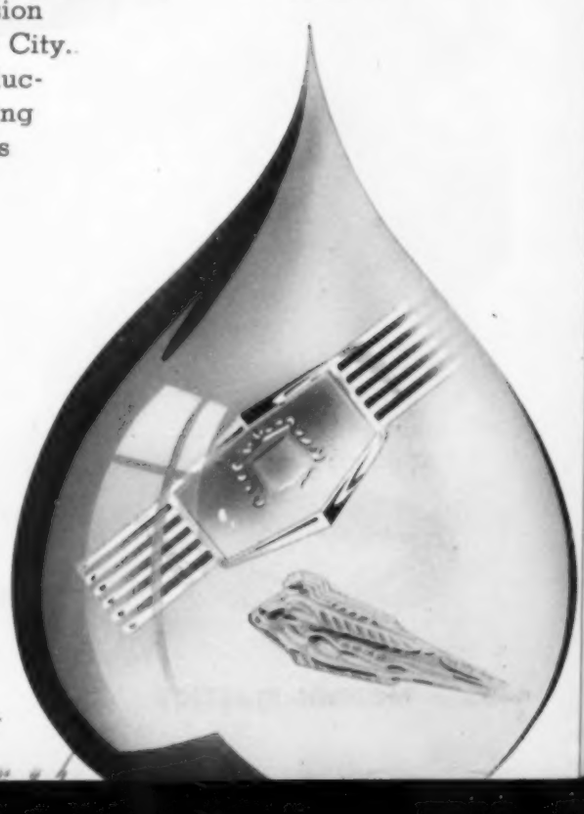
Quintessence of Utility

• Modern designers are proving that beauty often leads to the ultimate in utility. This new trend is finding full expression at Auto-Lite's great Bay Manufacturing Division in Bay City. Here under one roof are the technical skills and production capacity for a new art rendered in plastics including brilliantly colored elastomeric plastics, decorated metals and metal-plastic combinations. The artistic skill of Auto-Lite's Art and Style Division is available on matters of design and development.

THE ELECTRIC AUTO-LITE COMPANY

Bay Manufacturing Division

723 New Center Bldg., Detroit 2, Mich. • Bay City, Mich.



Auto-Lite

plastics and metals

AUTO-LITE MEANS PRECISION MANUFACTURING

Tune in "Suspense-", the Auto-Lite Radio Show, Thursday, 9:00 P.M.—E.S.T. on CBS.

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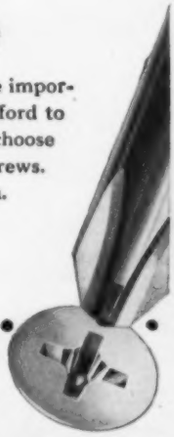
One of the essentials you can't afford to overlook in choosing a cross recessed head screw is that service and repairmen everywhere be familiar with your fastenings, and have the necessary driving tools.

Phillips Hand Screw Drivers and Bits are available throughout the country, stocked by regular hardware outlets, chain stores and industrial supply houses. They are standard equipment today for maintenance workers, mechanics, small shop repairmen, and the household handyman.

Phillips Recessed Head Screws are rapidly becoming the preferred screws for all types of industrial assembly. They can help you speed work, stop spoilage, add strength and smartness. Remember, *only* Phillips Screws give you *all* the advantages of the cross recess design. Specify Phillips.

Get this helpful new booklet

that lets you in on the important facts you can't afford to overlook when you choose cross recessed head screws. It's FREE. Use the coupon.



GET ALL THE ADVANTAGES OF ASSEMBLY WITH CROSS RECESSED HEAD SCREWS . . .

GET **PHILLIPS** *Recessed Head* **SCREWS**

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

27 SOURCES

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Send me the new booklet—"How to Select Recessed Head Screws for Practical Production Driving".

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MP-36

A Cast Phenolic Resin of Exceptional Properties!

MARBLETTE

Outstanding among plastics, Marblette has a jewel like depth and a complete color range which duplicates the appearance of precious stones, tortoise shell and ivory.

Its almost infinite variety of colors is available in transparent, translucent, opaque, or in mottled effects. Marblette also comes in a water clear form known as "Crystle."

Marblette's machining characteristics, resistance to oils and acids, non-inflammability and exciting beauty make it ideal for countless manufacturing needs.

MARBLETTE will help plan your world of tomorrow. The Marblette staff of engineers offers its services to help with your manufacturing problems. Write to us outlining your needs.

SPECIAL CASTINGS

Marblette is supplied in sheets, rods, tubes, and special castings such as cutlery handles, kitchen utensil handles, pipe stems, cigarette holders, clock cases, automotive trimmings, jewelry items, buckles, etc. Special shapes made to customer's specifications can be supplied provided draft is all one way.

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Manufacturers of Phenolic Resins since 1929

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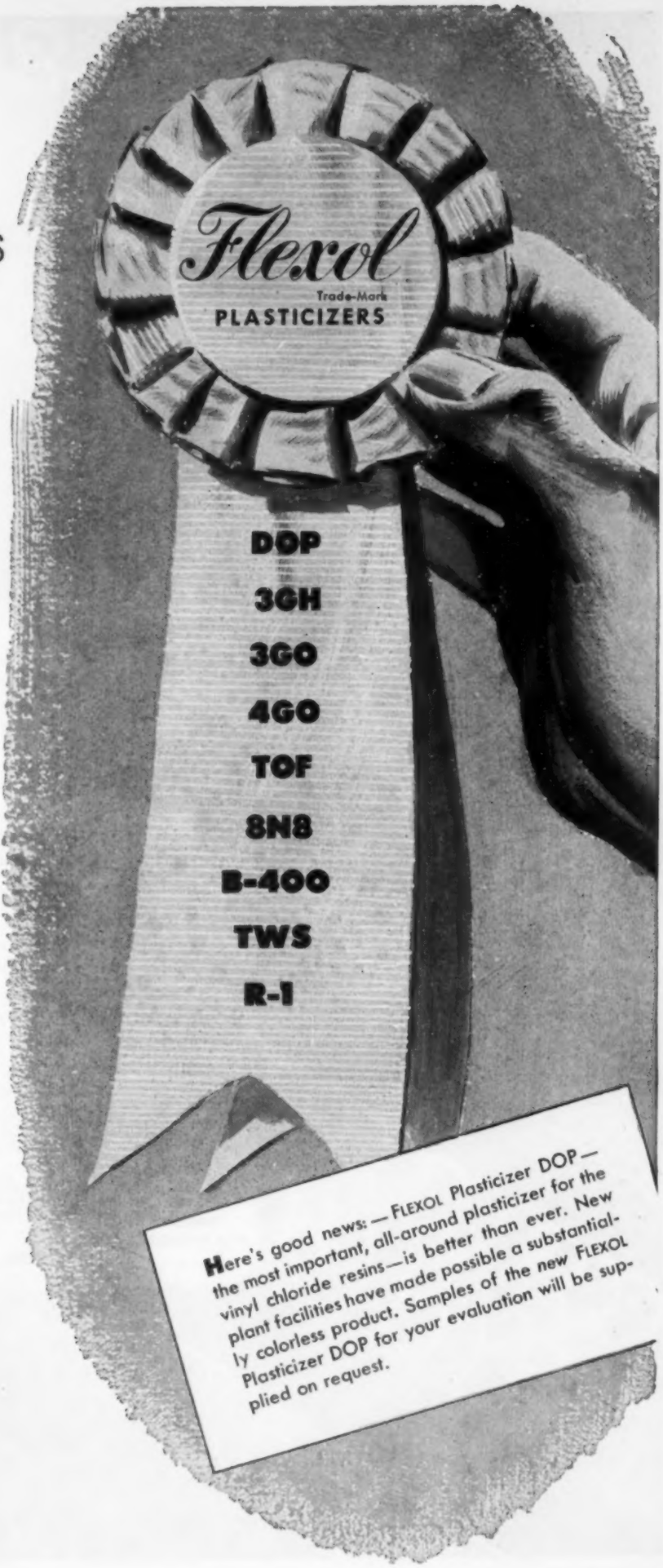
How to **WIN** with plastics

A plastics product can only be as good as the plasticizer with which it is compounded. And you *can win* preference for your product through the choice of the right plasticizer.

FLEXOL plasticizers, of which there are now nine, offer plastics and rubber manufacturers wide scope to meet the general requirements of compatibility and non-volatility. In addition, each FLEXOL plasticizer, when compounded with vinyl resins, cellulose derivatives, and rubber, is outstanding in producing one or more special properties — such as low-temperature flexibility, resilience, and non-migration.

Our laboratories have prepared extensive data on the performance of FLEXOL plasticizers. The information is offered to assist you in selecting the *right plasticizer* or combination of plasticizers for your needs. Call or write our nearest office for F-5882, or for samples and prices.

"Flexol" is a registered trade-mark of C&CCC.



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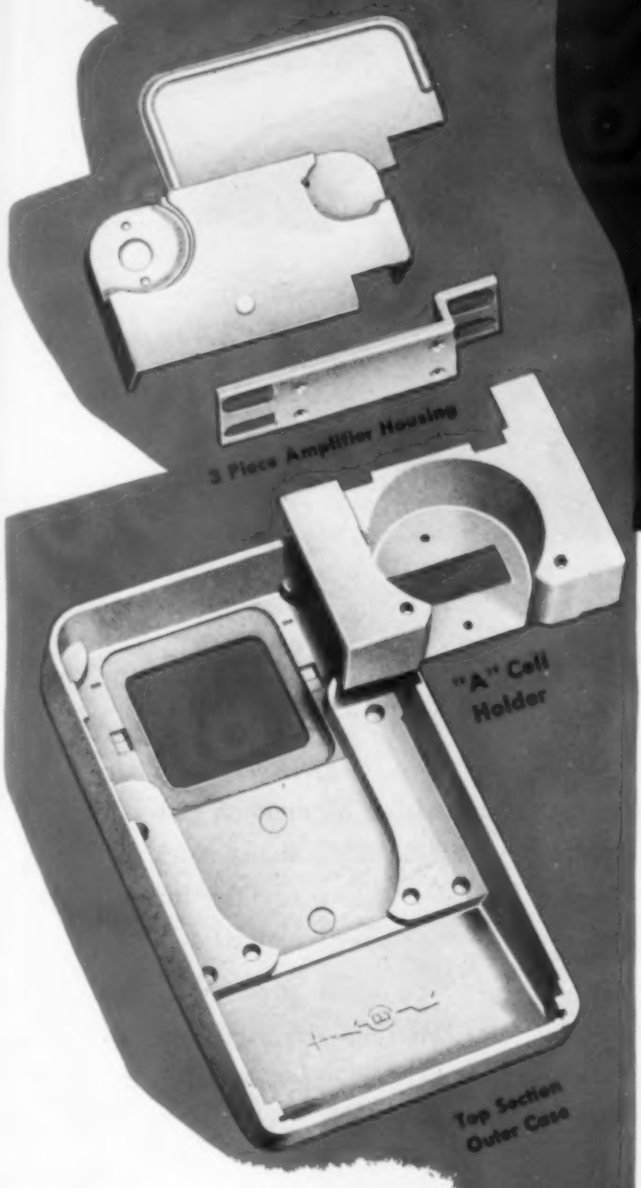
Difficult and Exacting

BUT AGAIN MPM SUCCESSFULLY HANDLED THE ENTIRE PROJECT —MOLDS AND MOLDING....



HERE is another case where Minneapolis Plastic Molders specialized experience has paid off in solving an unusually difficult molding problem involving rigid specifications.

All mold making and molding for the sensational new Microtone "Lifetime" Hearing Aid has been handled by MPM. That means full responsibility centralized at one source. The three pieces of the amplifier housing must fit together exactly. Here, because of their complex and fragile design, and to provide dimensional stability and minimize warpage, the parts are transfer molded. The assembled amplifier unit, together with the "A" cell holder must then fit with glove-like snugness into the compression molded hearing aid case. All six parts are molded from urea formaldehyde.

On this assignment as with the work being done for other manufacturers of nationally known products, Minneapolis Plastic Molders achievements are helping to broaden the field for the entire plastics industry. And remember, MPM facilities are complete—mold design, mold making, hobs and hobbing, compression, injection and transfer molding.

MINNEAPOLIS PLASTIC MOLDERS, INC.

Affiliated with Pal Tool Co.

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Stock Pulls, Knobs and Pendants

Versatile molded plastic products like these by Grigoleit offer the product designer an attractive combination of modern styling and economical price. Here are but a few of the many stock pulls, knobs and pendants styled for sales . . . ready for immediate shipment. As always—your best bet is Grigoleit!

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backed by

• sound engineering

• dependable service

Looking for a producer of top-quality molded plastics? A way to improve your present products? The solution to a product design problem? No need to look further! At General Industries you'll find satisfaction in a hurry. Here's why:

EXPERIENCE—gained from more than a quarter century of molded plastics leadership—is at your disposal. At the left are but a few of the countless top-quality products which have been produced efficiently and economically on a mass production basis.

SOUND ENGINEERING — furnished by a highly competent engineering staff — always ready to lend capable design assistance or to tackle a new molding problem.

DEPENDABLE SERVICE — important to you because it means "delivery as promised" and production *exactly* as specified on every job.

These are three of the reasons why many of America's leading manufacturers already are General Industries customers—reasons, too, why it will pay you to discuss your molded plastics requirements with a General Industries representative.

Remember: The only obligation is ours —*to help you.*

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MOLDED PLASTICS PIONEERS
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For Standard Plastics Parts, see

We manufacture and stock complete lines of plastic knobs and handles, only a few of which can be shown here. New designs are constantly being added. For catalogs, specifications, prices, or samples, write Kurz-Kasch — America's foremost source of standard plastic knobs and handles.

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ACCURACY of reproduction is the first consideration in this "American" hydraulic shaft-duplicating lathe. By using 24 Timken® tapered roller bearings in its construction, The American Tool Works Company has assured precision performance that will be maintained through years of dependable service.

Timken bearings in machine tools like this offer a combination of advantages that no other bearing can duplicate. Their tapered design carries both radial and thrust loads without shaft deflection or end-movement, and permits accurate pre-loading to any desired degree. Spindles are held rigid; chatter is eliminated. The line contact between the rolls and races gives exceptional load-carrying capacity. Finishing to incredible smoothness reduces friction to a minimum.

Timken bearings normally last the life of the machine. Even after long periods of operation, wear is negligible.

The superiority of machine tools equipped with Timken bearings is recognized by users everywhere. Be sure you get Timken bearings in the machines you buy or build. Look for the trade-mark "Timken" on the bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

This label on a product means its bearings are the best.

THE AMERICAN TOOL WORKS COMPANY uses a total of 24 Timken bearings on the spindle, intermediate shafts and back gear shafts of this "American" Hydraulic Shaft-Duplicating Lathe.

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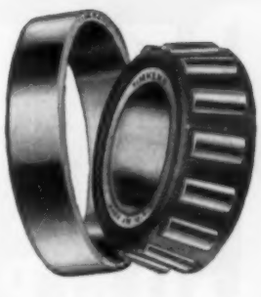
An extra step in the manufacture of Timken bearings—after assembly—results in a natural and true geometric contact being generated between all rotating parts.

This perfect mating of the component parts—cone, rolls and cup—assures positive roll alignment, long lasting precision, permanent adjustment and smooth operation.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ▯ AND THRUST ▯→ LOADS OR ANY COMBINATION ✳

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FLEXIBLE VINYL INJECTION MOLDING COMPOUND

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Above photograph taken in plant of GERBER PLASTIC COMPANY, Saint Louis, Missouri, depicting our high speed flexible vinyl molding material being molded on standard 9 oz. H. P. M. press at 125 shots per hour — 9 cavity doll mold.

200 Lbs. to 5,000 Lbs.	32¢ Lb.
5000 Lbs. to 30,000 Lbs.	31¢ Lb.
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Available Immediately in Flesh Color. Other Pastel Colors can be supplied on minimum order for 10,000 Pounds.

Sample Offer

Up to 100 pounds available for test at 30¢ pound, F. O. B. St. Louis, Mo.

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Cookie Cutters, Molded for the Chickadees, Tulsa, Oklahoma

Skillful Molding CUTS A CUTE COOKIE

These cookie cutters which we molded for the Chickadees, Tulsa, Oklahoma, are a real double feature. First they're attractive cookie cutters. Hang them on a Christmas tree and they're colorful ornaments.

To gain this double appeal, the product had to be made of a plastic material. We chose a material that would be kitchen practical as well as Christmas tree glamorous. Sound engineering plus exacting molding craftsmanship did the rest.

We will handle your plastic problems with the same careful consideration of your product's requirements. So whenever plastics are called for—make our new, modern plant your first step to a better plastic product.

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NEW ADDRESS

ELMER E. MILLS CORPORATION

INJECTION MOLDERS and EXTRUDERS of: Tenite, Lumarith, Plastacele, Fibestos, Lucite, Plexiglas, Nylon, Polystyrene, Styron, Lustron, Loalin, Vinylite, Geon, Plexene, Polyethylene, Cerex, Forticel, MILLS-PLASTIC *, Saran, and other Thermoplastic Materials.

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*Write on your letterhead for the new Injection Molded and Extruded Plastics Catalog. Or, for detailed information about MILLS-PLASTIC *, piping, tubing and fittings, write for circulars containing data and illustrations.*

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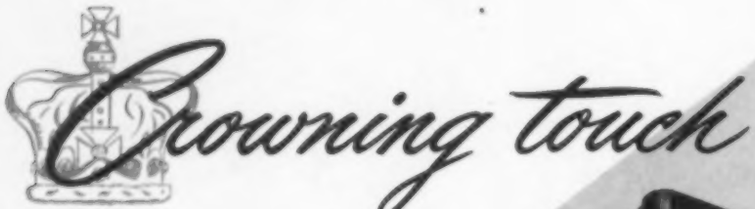
MPc Plastics add the



Crowning touch

to Royal Luminaires*

The sleek plastic fittings on these fluorescent lighting fixtures are called "end crowns" . . . and rightly so! While they conceal unsightly sockets, they also crown the ends of these modern luminaires with just the right touch of color in smooth line and modern design.

Tooled at **MPc** and molded with internal assembly studs, no fasteners show on the completed fixture. Here is another example of plastics intelligently applied to combine utility with beauty. Submit your plastics product or problem to MOLDED PRODUCTS CORPORATION, 4535 W. Harrison St., Chicago 24, Illinois

COMPRESSION, INJECTION AND TRANSFER MOLDING

PLASTICS DIVISION
MOLDED MPc PRODUCTS
CORPORATION

*PRODUCT OF ELECTRO MANUFACTURING CORPORATION, CHICAGO, ILLINOIS

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has acquired the laboratories and training facilities and has retained the staff of

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WEST COAST UNIVERSITY *invites the cooperation of the plastics industry in the continuing development and improvement of practical programs of plastics education and training.*

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VICTOR ELCONIN
Dean, College of Engineering, West Coast University

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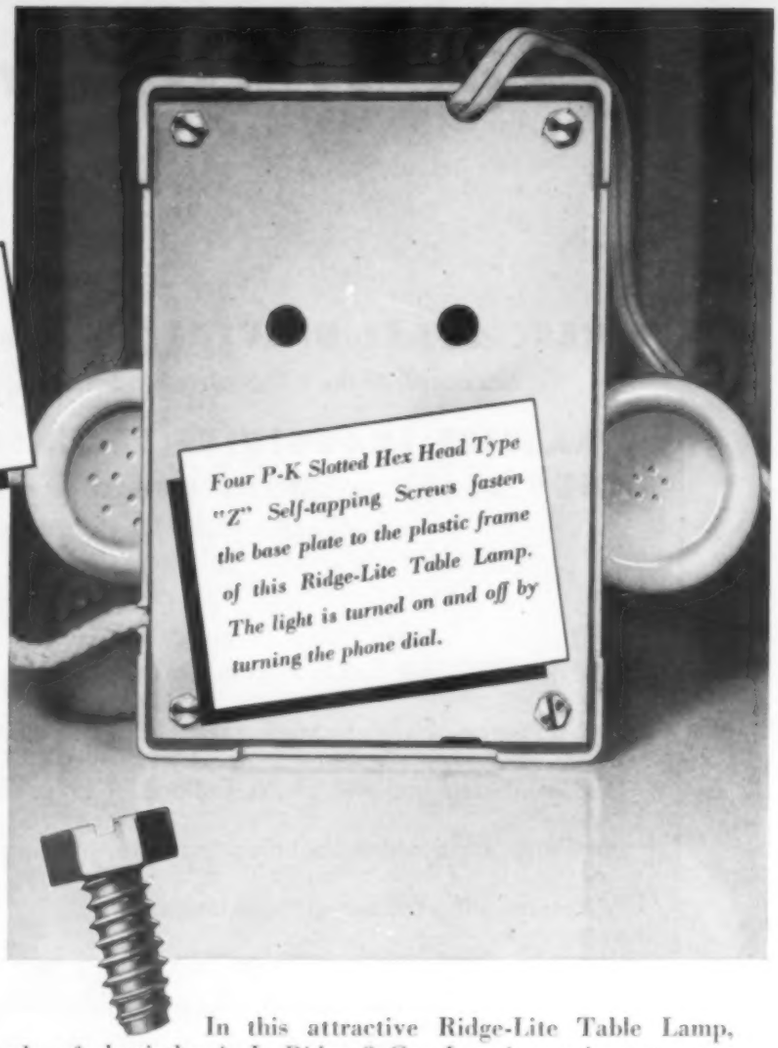
COMMON SENSE

ASSEMBLY ENGINEERING

CALLS FOR
P-K SELF-TAPPING SCREWS
IN ANOTHER PLASTIC PRODUCT

Simplifies Design ➡
Speeds Fastening ➡
Adds Strength ➡



In this attractive Ridge-Lite Table Lamp, made of plastic by A. L. Ridge & Co., Inc., it was important to keep assembly costs down. At the same time sturdiness was important, since the lamp was designed for a child's bedroom.

With these requirements in mind, it was only common sense to select P-K Self-tapping Screws for fastening the base plate to the plastic frame. Because P-K Screws form their own threads as they are driven into plain holes, no costly tapping or mold slowing inserts were necessary. Assembly time savings were substantial and the desired strength was added.

Wherever fastenings are used in your product assembly, consider the simpler P-K method. In seven out of ten cases, P-K Self-tapping Screws permit savings up to 50% in work hours by eliminating unnecessary operations. In addition, P-K Screws often add extra strength and permit improvements in product design.

Whether your product is in the planning stage or in production, call in a P-K Assembly Engineer and talk it over. Or, if you prefer, mail assembly details for recommendations. Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.

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PARKER-KALON PRODUCTS COLD-FORGED SOCKET SCREWS, WING NUTS, THUMB SCREWS • HARDENED SCREWNAILS AND MASONRY NAILS
SHUR-GRIP FILE AND SOLDER IRON HANDLES • METAL PUNCHES • DAMPER REGULATORS AND ACCESSORIES

ASK STOKES

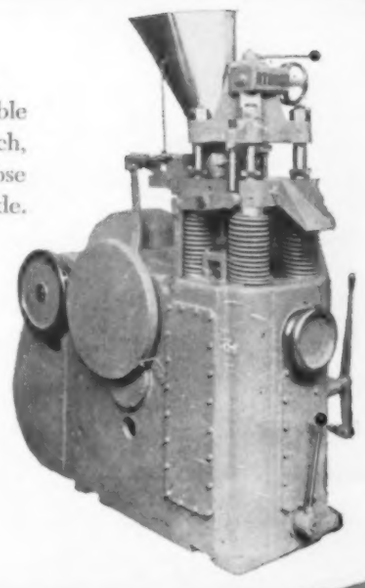
NOW take a look at Stokes NEW Dual Pressure Preformer

USING the Dual-pressure principle for the first time in preforming, the new Stokes 294 Preforming press applies equal pressure simultaneously from top and bottom, assuring uniform density throughout the preform. This new press makes preforms up to 4" in diameter with a maximum die-fill of 2⅝". Less power is required to give high pressures, and punch and die wear is reduced. Moreover, power-application is so planned that the Stokes press cannot jam – or even *be* – on dead center.

F. J. Stokes Machine Co., 5934 Tabor Rd., Phila. 20, Pa

FJS

The NEW Model 294 Preformer is a valuable addition to the Stokes line of 10 Single Punch, High Speed Rotary, and General Purpose Preformers for every requirement of the trade.



Stokes makes Semi-Automatic and Automatic Molding Presses, Plunger Presses, Closure Presses, Preforming Presses, Industrial Tabletting and Powder Metal Presses, Vacuum and Special Processing equipment, Water Stills and Special Machinery.

STOKES KNOWS HOW

ASK STOKES

Plunger Molding at a Profit... Efficient and Adaptable, too!

NEW models of 200 and 300-ton capacity supplement the smaller models of 50 and 150 tons capacity in the Stokes line of efficient high-speed Plunger Molding Presses.

With greater capacity to meet the growing demand of Plunger Molding users, Stokes has combined all the advantages of earlier successful models.

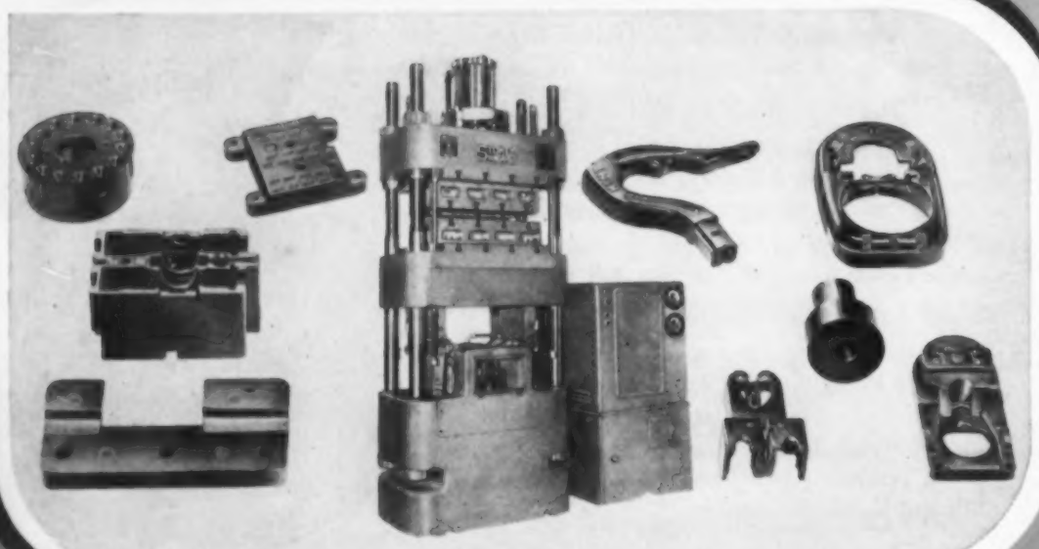
Operation is automatic except for loading and unloading. The patented Stokes Automatic Cycle Controller saves seconds on every cycle . . . gives more heats per hour . . . and provides finished parts of superb quality.

Users find that the "toggle-lock" design assures positive clamping of the mold against the pressure of the transfer cylinder . . . a principle proved in thousands of injection molding machines. Then, too, the toggle-lock design, which eliminates the need for high pressure on Stokes machines, cuts power and maintenance costs to rock-bottom.

Two individual pumps provide independent control of clamping and plunger pressures. Adjustments are simple, and easily compensate for changes in temperature of preforms and size of sprues. Changeover from plunger to compression molding is accomplished by a simple controller adjustment.

Stokes makes Semi-Automatic Plastic Molding Presses, Preforming Presses, Plunger Presses, Powder Metal and Ceramic Presses, Vacuum Pumps and Gages, High Vacuum Processing Equipment, Special Machines.

F. J. Stokes Machine Company, 5934 Tabor Road, Phila. 20, Pa.



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In a Plaxpak wrapper, Barden precision ball bearings remain at well-oiled ease. They are completely and lastingly protected against dirt and moisture. Should acid or alkalies drip on the wrap, there's no harm done.

Plaxpak delivers laboratory clean bearings to the assembly points. The oil used to keep the bearings lubricated has no effect on Plaxpak.

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No shortage of BETTER housings in Monsanto plastics

COUNT THE ADVANTAGES

1. IN FULL SUPPLY. The plastic you need, when you need it, just as automatically as the tick of the electrically controlled metronome molded in Lustron, Monsanto's polystyrene.

2. LOW COST. "ONE-shot" mass production saves finishing, saves costly assembly, takes "human element" losses out of production.

3. EASILY COMBINED WITH OTHER MATERIALS. Monsanto plastics can be combined harmoniously with other materials, without production difficulties.

4. HEAT-RESISTANCE. The General Electric portable radio cabinet has that extra margin of safety because Lustrex is extra durable, offers highest heat-resistance of any commercially available polystyrene plus all the advantages of regular polystyrene.

5. SALES APPEAL. Eye-catching, easily cleaned, rustproof, non-chipping, free of taste or odor . . . Lustron provides a sales plugging counter dispenser for Canada Dry.

Metronoma by Connecticut Plastic Products, Inc., Waterbury, Ct. for Crystal Research Laboratories, Inc., Hartford, Ct.

Portable radio cabinet molded of Lustrex by General Electric Company, Plastics Division, Pittsfield, Mass.

Canada Dry counter dispenser molded of Lustron by General Electric Company, Plastics Division, Pittsfield, Mass.

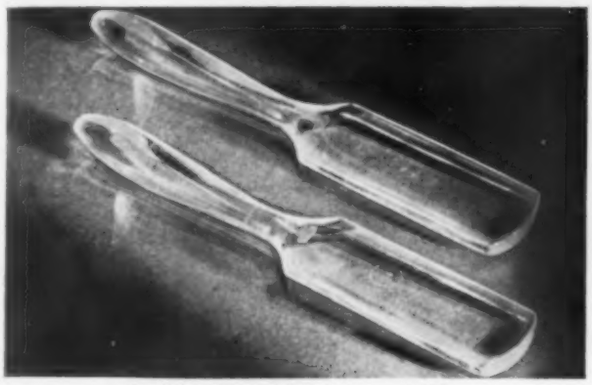
THREE MORE PRACTICAL EXAMPLES of better housing with Monsanto plastics. The Callmaster receiver shows how thermosetting Resinox is easily molded at low cost in intricate designs with metal inserts. NOTE:—Excellent optical properties and non-shattering characteristics of Lustron are ideal to house the translucent red temperature signal light. Sturdy, light weight Resinox features the portable UARCO Sales Register.

Callmaster Intercommunication Set molded of Resinox by REC Manufacturing Corp., Holliston, Mass. for Lyman Electronic Corp., Springfield, Mass.

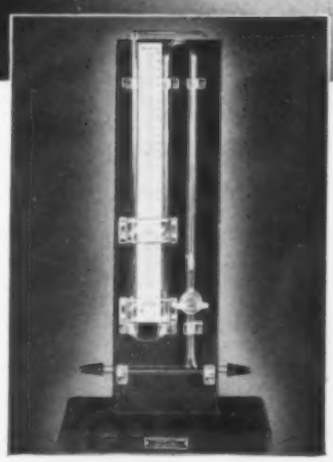
Temperature signal light of Monsanto Lustron molded by Formold Plastics, Inc., Chicago, Illinois, for McCary Manufacturing Co., El Paso, Texas.

Portable UARCO Autographic Register, body molded of Resinox by Chicago Molded Products Corp., Chicago, Ill., for UARCO Incorporated, Chicago, Ill.

LUSTRON L20-20 means



Brush handles molded of Lustron L2020.



Molded by Connecticut Plastic Products, Waterbury, Conn.

◀ Manometer slides and clips molded by W-L Molding Co., Kalamazoo, Mich., for Fisher Scientific Co., Pittsburgh, Pa.

TWENTY
TWENTY
CLARITY

Monsanto's Lustron L2020 gives you enduring, water white crystal with definitely superior clarity over other commercially available polystyrene. Actual tests showed these results when L2020 was compared with other leading types of crystal polystyrene.

MATERIAL	YELLOWNESS
Lustron L2020	1.8
Crystal A	2.4
" B	2.5
" C	2.7
" D	2.8
" E	3.0
" F	3.2
" G	3.3
" H	4.8
" I	6.2

Check the clarity of this unexcelled water white crystal when you need exceptionally good transparency that is clear even in thick sections, without cloudiness. Check its excellent optical properties and ability to pipe light. Check L2020, too, for putting extra beauty, utility, and sales into your product.

There are twelve groups of Monsanto plastic materials with thousands of uses. And new uses are constantly being developed. That's why it will pay you to look into Monsanto plastics now . . . to take advantage of ready supply and special technical help.

Lustron, Lustrex, Resinox: Reg. U. S. Pat. Off.

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MONSANTO CHEMICAL COMPANY, PLASTICS DIVISION
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Please send me information on ☐ *Lustron,* ☐ *Lustrex,* ☐ *Resinox.*
An enclosed letter describes the use I have in mind for plastics.

Name _____ Title _____

Company _____

Address _____

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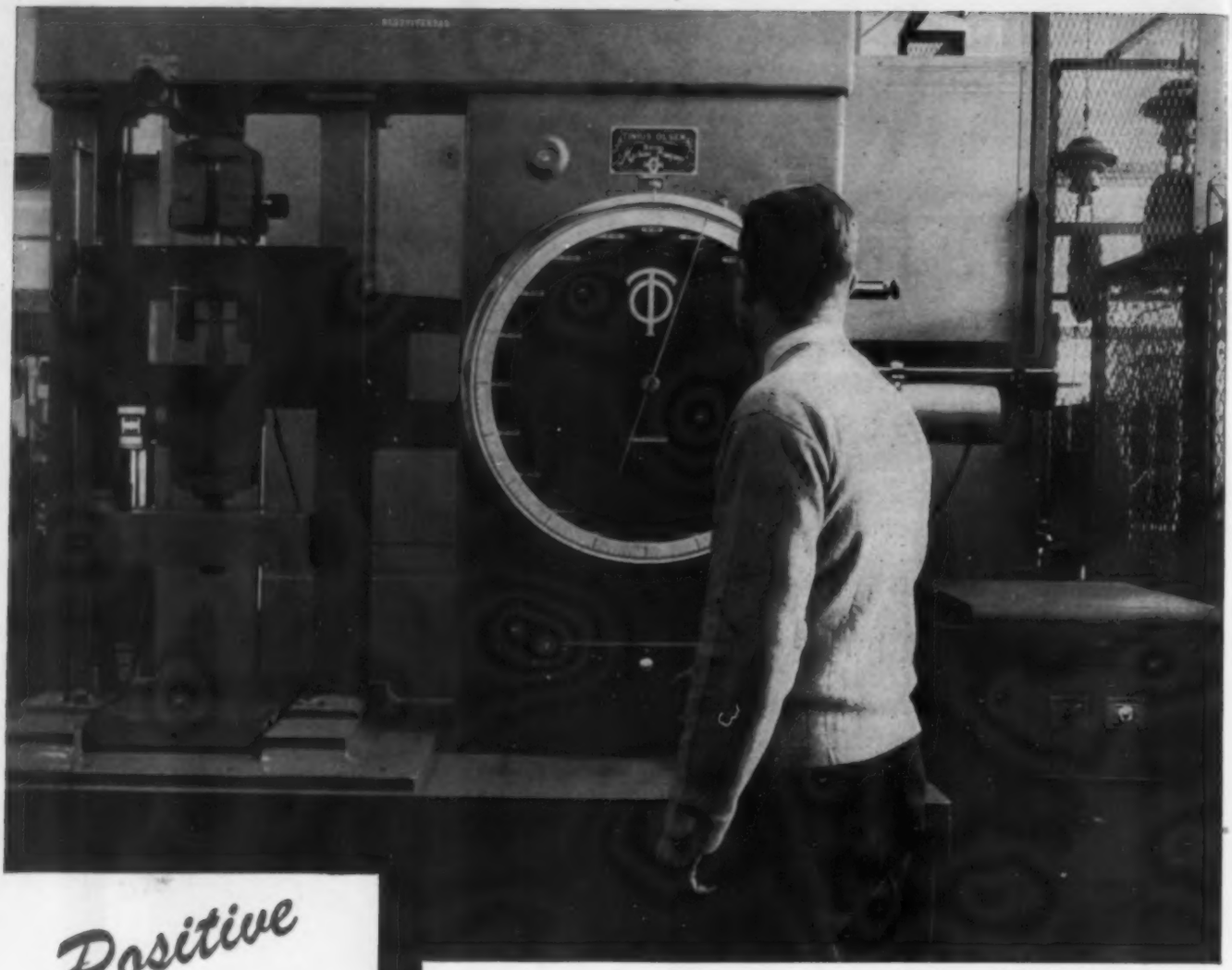

Olsen Plastiversal with Electronic High Magnification Recorder. Courtesy of the Bakelite Corporation, Bound Brook, New Jersey

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Extreme Temperature Tests

with the

OLSEN PLASTIVERSAL

The Olsen Plastiversal Testing Machine equipped with the Olsen High Magnification Recorder, produces in chart form, accurate stress-strain curves for each test run. The specimen may be placed in a temperature controlled cabinet and, whether testing for tension, compression or flexure, the Extensometer records each physical change for the complete range of temperatures.

For dependability, high accuracy and ease of operation the Olsen Plastiversal is an invaluable aid in the comparison, standardization, control and development of plastic materials.

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This crystal clear Polystyrene tray for G. E. refrigerators can hide no flaw in appearance, or warp or distort under conditions of high temperature and humidity. Only severe tests could prove its all-around qualifications for duty.

Erie Resistor is now equipped to injection mold larger pieces than ever with the installation of a new 28 oz. molding press.

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Nothing is taken for granted in the plastic product which you get from Erie Resistor. Appearance is not enough. The visual test which says, "It looks all right," is the beginning and not the end . . . any molding which must withstand unusual conditions in use must stand superlatively unusual conditions in the testing laboratory.

This large flat refrigerator tray, for instance, had to prove its ability to resist warpage at any possible temperature to which it would be subjected. It also had to serve a "5 day term" in the humidity cabinet shown at left, 100% relative humidity at 110° F, to prove its non-absorbent qualities.

There is no guesswork about the plastic product that is molded by Erie Resistor . . . it's molded to perform the function for which it was planned.

Plastics Division

ERIE RESISTOR CORP., ERIE, PA.

LONDON, ENGLAND • • TORONTO, CANADA

Good FM and television reception requires proper aerial equipment. The molded stand-off insulator shown here is an important safeguard. Exclusive design simplifies threading and secures line. Made of plastic, it withstands weather conditions. The material was chosen for required dielectric properties, and precision-molded by Plastic Manufacturers, Inc. for THE WARD PRODUCTS CORPORATION, *Division of The Gabriel Company.*

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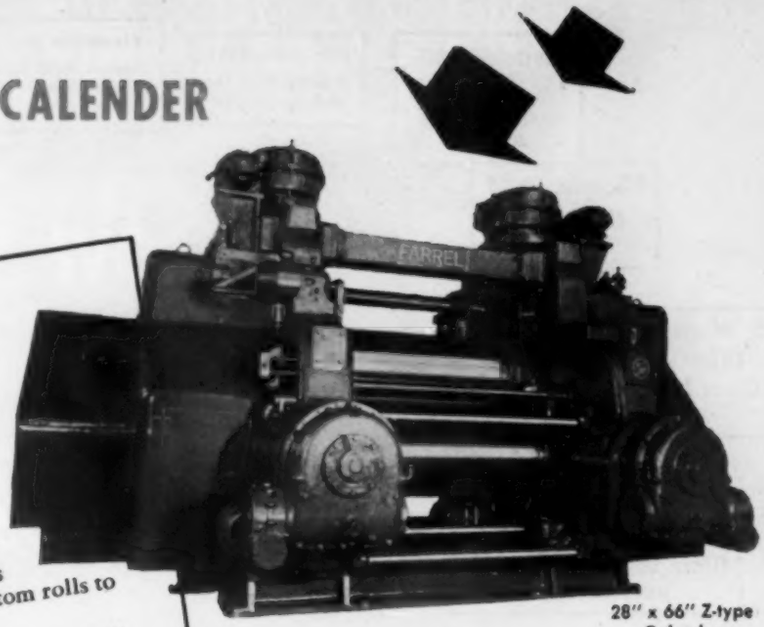
THIS IS PROBABLY THE MOST VERSATILE CALENDER EVER BUILT



28" x 66" Z-type Calender

Special design features permit calendering a wide range of products...to exact gauge ...at best production speeds

This *new* Farrel-Birmingham Z-type calender has a built-in device which provides means for crossing the axes of the two bottom rolls to compensate for roll deflection.

With this device, the amount of the opening created by crossing the roll axes (which is closely equivalent to roll crown) can be varied at will by simply pushing a button. Thus the "crown" can quickly be changed to compensate for the differences in separating force caused by variations in stock composition, gauge and speed. A flat gauge is obtained across the entire width on a variety of stocks, under a wide range of calendering conditions.

In addition to this "crown" control feature, other innovations that contribute to this calender's unusual performance ability include:

1. "Z" arrangement of rolls. No vertical pressure from a third roll affects roll settings. Exposure of material on any roll surface is limited to a 90° arc.
2. Positive roll positioning by hydraulic preloading devices which anchor the rolls exactly as set.
3. Rolls chamber-bored and drilled under the working surface for most effective temperature control.
4. Improved system of flood-lubrication for roll journals.
5. Drive and connecting gears enclosed in a housing separate from the calender.

Write for further information or engineering assistance.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
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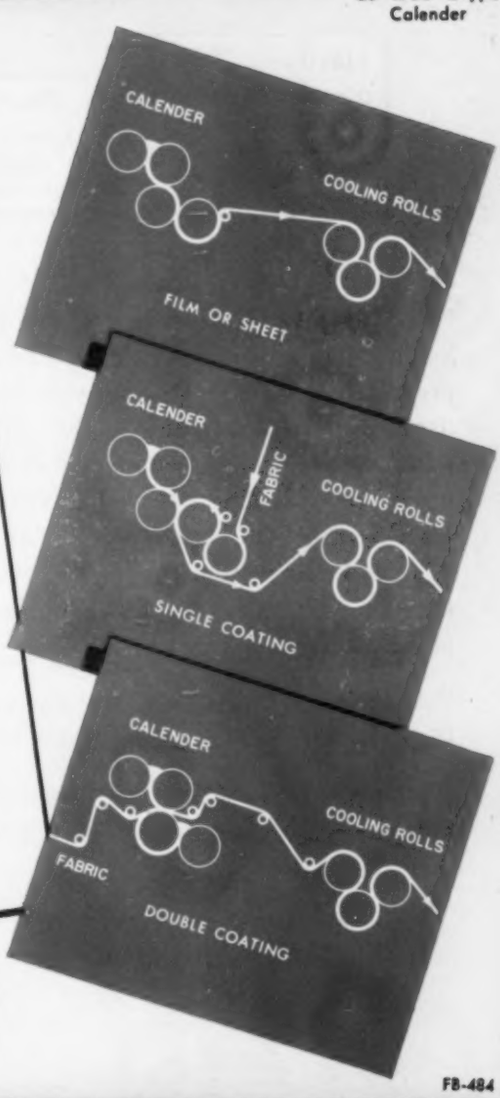


8" x 16" Z-type Laboratory Calender

FB-484

Farrel-Birmingham

Plastolein 9315 *for air-drying and Baking Alkyds*

Plastolein 9622 *A fatty acid for Baking Alkyds*

Plastolein 9111 *Azelaic Acid for non-drying Alkyds*

Plastolein 9114 *Pelargonic Acid*

Plastolein 9305 *High-bake finishes*

A LOW VISCOSITY RESINOUS PLASTICIZER

"Plastolein" 9715

Plastolein 9050 *Dihexyl Azelate Clear films, Low-vis dispersions*

Plastolein 9058 *Dioctyl Azelate Clear films Low temperature performance*

Plastolein 9055 *Diethylene glycol dipelargonate low temperature performance*

Plastolein 9250 *Tetrahydro-furfuryl oleate Superior Internal lubrication*

for Solution Coatings... Calender Compounds ...Dispersions

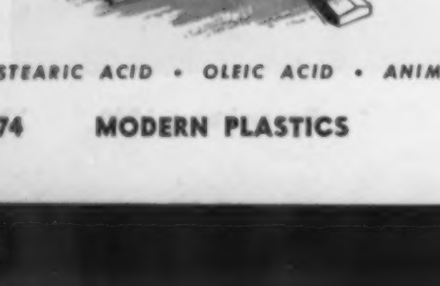
PLASTOLEIN 9715, although resinous in nature, has a low viscosity which makes possible the preparation of free-flowing organosols and plastisols. High efficiency, excellent low temperature performance, negligible volatility and good oil resistance make Emery Plastolein 9715 an ideal plasticizer for PVC. For very soft stocks, Plastolein 9715 may be combined with chemical plasticizers such as tricresyl phosphate, dioctyl phthalate, etc.

Polyvinyl acetate compounds containing Emery's Plastolein 9715 are very flexible, tough and clear.

Recommended for adhesives, oil-resistant paper coatings, cellophane lamination, etc.

PLASTOLEIN 9058—The 2-ethyl hexyl ester of azelaic acid has a number of outstanding properties which make it an ideal primary plasticizer, particularly for the vinyls. Among these are low volatility and high water resistance. It imparts excellent low temperature flexibility to films which are clear, free from haze, and possess excellent tear strength.

PLASTOLEIN 9305—Double distilled, Emersol-processed fatty acids which have a drying power equivalent to soya fatty acids but with greater color stability is recommended for high-bake finishes. Plastolein 9315, a double distilled soya-type fatty acid with an exceptionally high content of polyunsaturates, is recommended for the preparation of fast drying alkyd resins, air drying or baked.



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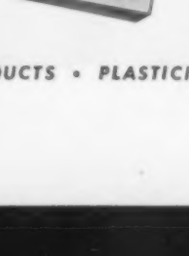

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MODERN PLASTICS

VOLUME 26 DECEMBER 1948 NUMBER 4

The Economics of Extrusion

First of a series of three articles which examine the economic factors in plastics extrusion, point up trends in application, expose possible pitfalls in the business and encourage a sound approach to problems involving materials and methods

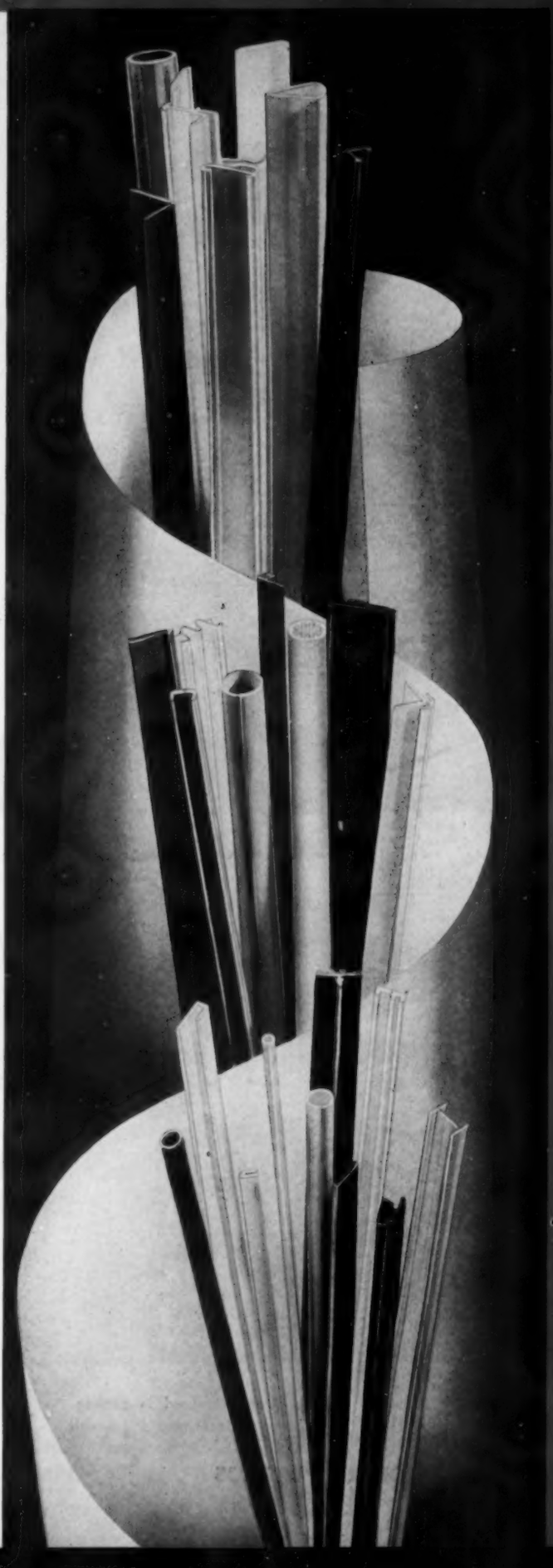
GREENEST-looking new fields for plastics — and they don't look far away — are the fields for extrusions. Nearly all the old fields for extruded plastics look verdant also. There are three important reasons.

First, new materials and improved techniques and equipment have combined to make it possible to offer the products of extrusion to fabulous new markets. Second, the very economics of the process —low cost of dies, continuity of operation, versatility of equipment — make its plastics products prime competitors with those of other processes. Third, the use of extruding machines, not as end-product manufacturing devices but as compounders and partial processors, is becoming an established practice in the plastics industry.

Small wonder there's so much current excitement about the extrusion of plastics!

Extrusion of plastics has been going on for years. Wet extrusion (with solvent) of cellulose nitrate is almost as ancient as rubber extrusion; dry extrusion (without solvent) of cellulose acetate and other thermoplastics was introduced just 10 years ago with equipment adapted from the rubber industry. Today nearly all thermoplastic extrusion is dry.

The record of extruder installation in the plastics industry is significant. The first machine for dry extrusion was developed in 1937 by Detroit Macoid Corp.; possibly three machines were in use by 1939; 850 were reported in use in 1945; 1327 in 1947. Every extruding machine maker reports a 50% increase



EXTRUSIONS IN PHOTO COURTESY THE HOPP PRESS, INC., AND TENNESSEE EASTMAN CORP.

COURTESY TENNESSEE EASTMAN CORP.

Toy is blow molded from highly formable dry extruded acetate sheet produced by Joseph Davis Molding Co.

COURTESY BAKELITE CORP.

Extruded polyethylene film, extensively used in packaging, forms this bag which protects peat moss and humus

in sales in 1948 and expects at least another 50% increase in 1949. Also significant is where these machines were sold: up until 1946 over half of them went to wire coaters; in the past two years most of the new units went to custom extruders; currently a high percentage is going to proprietary extruders such as packaging sheet material makers, filament makers, and large manufacturing companies which are installing plastics extruding departments.

Wire coaters and custom extruders are presently replacing older equipment to take full advantage of new resins and machine improvements and to accommodate new markets. By 1950 an estimated 1800 plastics extruding machines will probably be in operation in the United States. A sidelight is that one maker of extruders reports an export sale this year of 40% of the machines he made. How profitable these machines will prove to their owners is a matter of market and production economics, of specialization or diversification, of proprietary product or custom service enterprise.

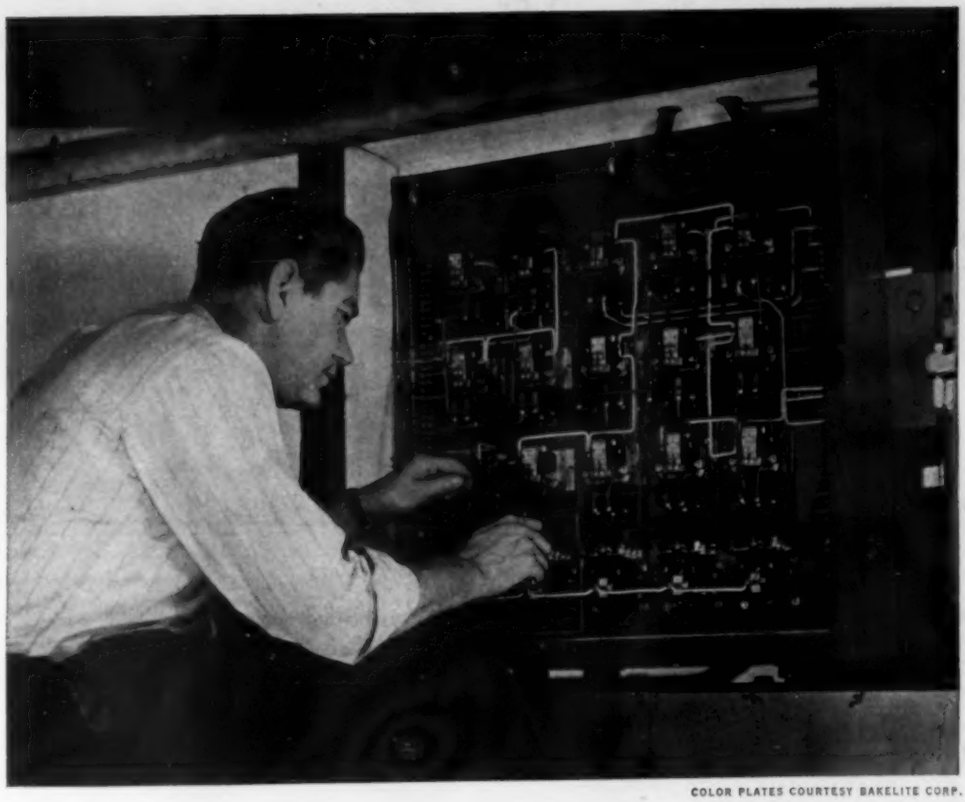
Literally no all-plastics extrusion is self-sufficient to any market. Extrusion helps plastics compete with other materials—rubber, metal, paper, natural fibers, wood, leather, and enamel to name a few. As a process for plastics product making, it competes with injection molding, casting, and calendering. Due to recent developments, it now contributes to the economics of thermoplastic molding. No matter how the extrusion process is used, it serves in cooperation with other processes and other or similar materials to make better or less costly products, which is why its apparent markets are so magnificent.

Wire and cable coatings

Since 1939 the users of electricity have increased in number by 60% and the average per-customer demand for electrical power has doubled. Underwriter's Laboratories reports show that production of all labelled electrical wire amounted to 5,156,065,750 ft. in 1946 compared with 1,759,025,000 ft. in 1942. It will probably run over 6,500,000,000 ft. in 1948.

The dielectric properties of the vinyls, the polyamides, several copolymers, and polyethylene, their resistance to chemical and atmospheric attack, their light weight, and other qualities have caused them to become big in this field. Vinyls used with alkyds and with asbestos have special properties in wire coating; the former for underground use, the latter for flameproof applications. Polyethylene's capacity to withstand high voltage has made it a natural for underground power cable covering. Nylon, tough and inert to chemicals, is now being extruded at 1600 to 2000 ft. per min. over No. 20 wire, and at these speeds it is more economical than enamel.

Every month the Bell Telephone System now installs 250,000 new telephones, adds 170,000 miles of



All wires in this large relay panel are insulated with Vinylite color-coded coatings. This particular panel is used for process control in a chemical plant but similar coded wire is required in communications, the power transmission field, etc.

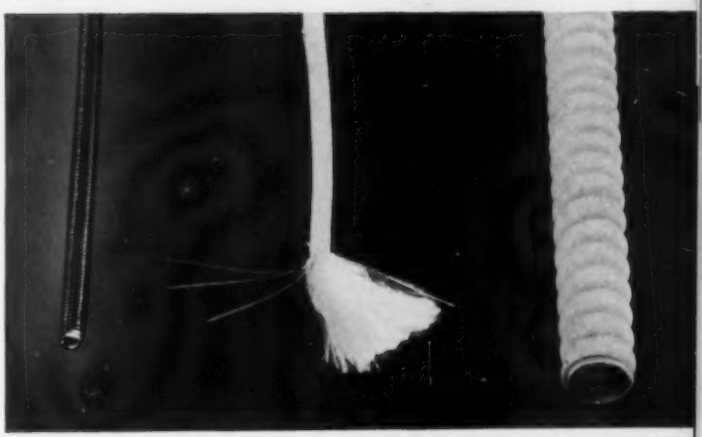
COLOR PLATES COURTESY BAKELITE CORP.

long distance circuits, changes 100,000 telephones to dial operation. More wire — covered with plastics extrusions. To switch one phone in the New York area over to dial operation takes miles of wire. Many circuits require color-coded wires, so plastics are preferred.

The coaxial cable, perfected in the past decade, is a device for carrying up to 1800 simultaneous telephone conversations on from 7 to 27 conductors in one casing. Without polyethylene extrusion for insulation, coaxial cable would not be as practical as it is today. Not only is over 2500 miles of coaxial now used in telephone service, with more required every day, but the whole television industry depends on it for both network hookup and receiving set installation. At the present time there are almost a million television sets in use, each of which required an average of 100 ft. of antenna lead-in, mostly polyethylene insulated. The television industry expects to have 13,500,000 sets in use by the end of 1952, making a market for one and a quarter billion ft. of coaxial cable, all of which involves extruded plastics — polyethylene, Teflon, and vinyl. Also contemplated is the use of at least 5000 miles of interstation cable on the networks.

Problems being overcome by wire coating extruders include shrinkage of polyethylene during cooling and the need for increased speed of vinyl coating.

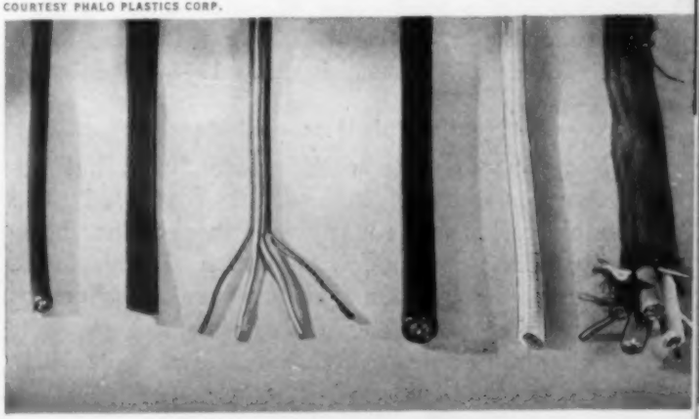
Wire coating is a specialized business and a proprietary business even when done to custom order. The extruder is selling coated wire, not a coat-



Left to right: Vinyl extruded over a coil spring; vinyl over fibers and wire; butyrate in spiral on wood core

Examples of coded extruded wire coatings range from simple coding (left) to complicated coaxial (right)

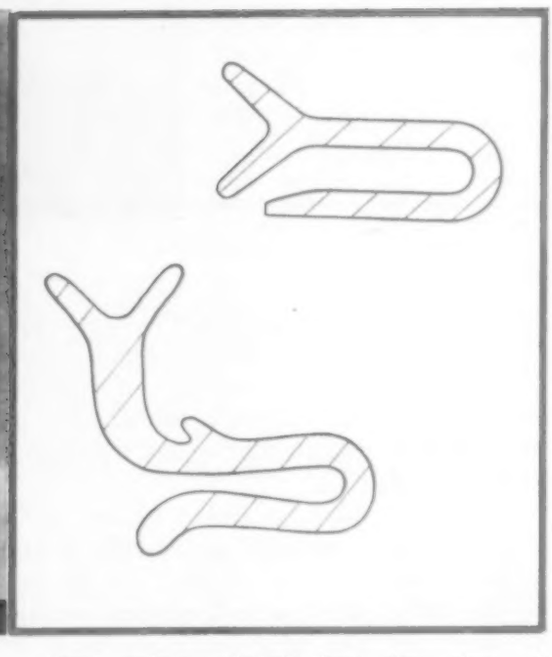
COURTESY PHALO PLASTICS CORP.



Each Lustron enameled steel house requires about 3000 ft. of polyvinyl chloride extrusion as "gasket" strip between the steel plates

COLOR PLATES COURTESY LUSTRON CORP.

As the steel plates of the Lustron house are assembled, the extruded gasket strips are set in place. Edges can be seen between plates below where man is working



Cross sections, enlarged about three times, of two of the types of gaskets used by Lustron Corp.

ing. Competition in the common grades and types is keen. The most successful custom wire-coating extruders are those who have worked out specialties, obtainable most readily from them. An example of this is the production of coded wire by Surprenant Electrical Insulation Co., Boston, Mass. (see MODERN PLASTICS, January 1948, page 142.)

Flexible plastics gaskets

Not next to wire coatings in volume, but important in current interest, are extruded strip flexible gaskets. The market for these is increasing daily in refrigerators, automobiles, and airplanes, as bumpers for vacuum cleaners and polishers, as channel and spline for applying glass and screening to aluminum and steel window frames, and in scores of other fields.

The biggest and the most dramatic new plastic gasket application is in the Lustron house, where polyvinyl chloride sealing strips are compressed between enameled steel panels to make the building air-tight and weather-tight. Production currently is around 10 homes a day, each of which requires about 3000 ft. of extruded gasket. By next month 100 Lustron houses per day will be coming off the line at Columbus, Ohio, which will represent a market for 300,000 lineal ft. of extrusion every 24 hours.

Two extruders worked with the Lustron Corp. on the project: Yardley Plastics Co., Columbus, Ohio, and the B. F. Goodrich Plastics Div. at Marietta, Ohio. Starting with a dozen extruded shapes, Lustron is now using four types: a) high-volume extrusion used in sealing the steel panels together, both interior and exterior; b) strip to be used

around windows; c) a heavy section gasket used around the bottom of the exterior of the house; d) a bathtub seal.

The battle for this market was between rubber and polyvinyl chloride and the tests were tough. A standard Weatherometer test for 1900 hours and a standard Fadeometer punishment for 2100 hours left the plastic practically untouched except for a slight surface discoloration which could easily be removed with cleansing powder and water; the best rubber compound began to harden and crack in the Weatherometer after 60 hours of exposure. The plastic was thereby proved good for approximately 30 times the life of the rubber, or for a period of 150 years.

A vinyl compound with a Shore Durometer hardness of 60 to 65 is used for the Lustron gasket. A material of this degree of hardness is necessary for proper resilience and power to absorb the contraction and expansion of the steel panels.

The designing job made the gray gaskets almost invisible between the pastel enamel panels of the house. An interesting sidelight is that pictures are hung by means of screws set in the stripping.

With the 5,000,000 refrigerators produced per year each requiring 15 to 20 ft. of plastic strip gasket material, 4,500,000 automobiles using from 20 to 35 ft. each, with upwards of 2,000,000 metal windows requiring from 20 to 40 ft. each, with further new big applications opening up every day, the market for gasket extrusions is huge.

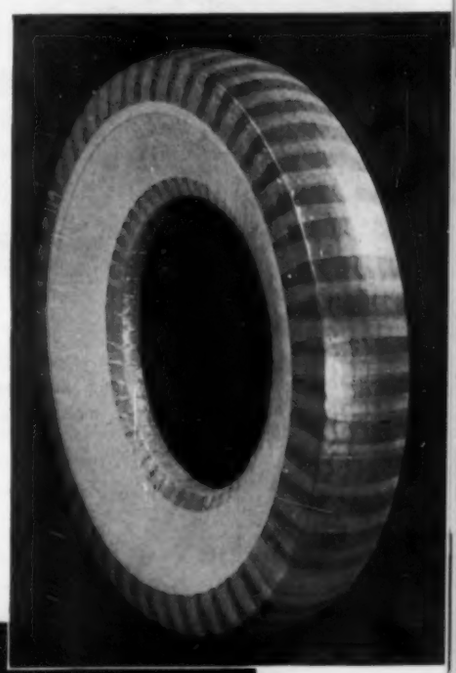
But the gasket market is an engineered market, and a price market. Successful selling in any of these fields will involve a custom extruder in extensive development work and will force a high operating efficiency.

There are on the market and under development several proprietary vinyl strip gaskets for use around bathtubs and windows, and to replace baseboard trim. These are generally marketed in a limited variety of colors and are supplied packaged with suitable adhesives. An example is the "Tub-Kove" made by Keller Products, Inc., East Cleveland, Ohio.

Film and sheet extrusion

Extrusion of thin sheet and tube for the packaging, apparel, and housewares field stands second only to wire coating in volume. It is estimated that 80% of all available polyethylene is going to extrusion; about half of that extrusion material is going into wire coating and the other half into packaging film. Since in 1948 the production of polyethylene was approximately 15,000,000 lb., the quantity extruded was 12,000,000 lb.; if the same use proportions are maintained in 1949, about 40,000,000 lb. of polyethylene will be extruded, at least half of which will be film.

Since polyethylene is more economically extruded than cast, it is a natural for this process. The film is now used in packaging everything from garden soil to frozen foods. Visking Corp., Chicago, and Plax Corp., Hartford, Conn., are two important extruders of polyethylene. Plax has just announced "Plaxpak" which is specially designed for the auto-



How Armstrong Rubber Co. uses extruded polyethylene film. Lower left: embossed camelback on which raw rubber is calendered. Below: protective package for storage of patch material in rolls. Right: spiral wrapping film for white wall tires

COURTESY PLAX CORP.

mobile tire field. Ten tire companies are using this film for one or more of the following purposes: to wrap new white wall tires; embossed, to replace camelback "Holland" cloth used on tube patches and as a base for calendered raw rubber material; and to protect white side walls before vulcanizing. Carter Products Corp., Cleveland, Ohio, makes a similar extrusion. The well known squeezeable polyethylene bottles made by Plax are a product of a special process of extrusion-blowing.

In considering the economics of polyethylene film and thin tube extrusion, the first point to be noted is one which will be reiterated time after time throughout this discussion: the "price" of conversion or the mark-ups from raw material cost to delivered extrusion are low and probably going lower. Polyethylene sells at from 46 to 52¢ a pound depending on quantity; extruded into film or tube it becomes worth 71¢ a pound. Compare this with the same material injection molded and it becomes obvious that pound-per-hour and hours of run are the keys to success in the extrusion market. Large film extruders state that unless a company is converting 1,500,000 pounds of polyethylene per year, it will be better advised to buy its film than to install an extruding department.

Experts in the field declare that below a film thickness of 0.005 in., casting of vinyls is cheaper than extrusion. An exception may be the nitrile rubber-plasticized vinyl used for margarine packaging, although the material made by both processes sells for about the same price. Space does not permit a full discussion of vinyl film extrusion. Suffice it to say that the same element of economics — low conversion mark-up — holds true here as in polyethylene. An average of today's market shows about 50% conversion mark-up over resin cost for vinyl film extrusion.

Extruded polystyrene sheet was a Plax development of two years ago. The product is now finding itself some worthy markets. It is not film, but is a reasonably rigid dry extruded sheet, either oriented or unoriented. Printed, it is made into place mats and doilies by the Ullman Co., Inc., New

An extruded flexible strip gasket designed to be applied with a waterproof adhesive to the junction of walls and bathtubs to seal the cracks and prevent moisture penetration

COURTESY SANDEE MFG. CO., AND SERVEL, INC.

An annual production of 5,000,000 refrigerators requires a total of approximately 100,000,000 feet of extruded plastic gaskets to be used for cushions and bumpers, as on the door at right

COURTESY THE ULLMAN CO., INC.

Extruded polystyrene sheet, printed in beautiful full-color designs, is sufficiently rigid to make its application to place mats a popular one

Light, rigid transparent boxes, with no cemented seams or corner holes, are drawn from extruded polystyrene sheet by Willson Magazine Camera Co.

COURTESY MODERN PACKAGING

York, N. Y. Die cut, it is used for storage battery separator plates. It is fabricated into packages by Willson Plastics Div., Willson Magazine Camera Co., Philadelphia, Pa., and others. Glassips, Inc., Philadelphia, Pa., uses it for manufacturing a spirally wound shell for dry cell battery cases. The electrical properties of polystyrene give market possibilities to the extruded sheet in electrical spacers and washers. White polystyrene extruded sheet is under test as a top sheet for laminated door liners for refrigerators.

Depending upon the specifications for the sheet, finish required, and the size of order, extruded polystyrene sheet sells at between 55¢ and $1.00 a pound converted. Since the material costs only from 27 to 34½¢ a pound, this is undoubtedly one of the highest conversion mark-ups in the field. But there is a joker: the speed of polystyrene extrusion is about half that of polyethylene or a vinyl.

As mentioned above, it has been generally held (but with some notable exceptions) that extruded material less than 0.005-in. thick cannot compete in price with cast material. And production of extruded acetate, ethyl cellulose, and butyrate rigid sheet over 0.005-in. thick has, until quite recently, resulted in unsatisfactory material with "fish eyes", heat blemishes, and other faults.

Two years ago (see MODERN PLASTICS, May 1946, page 132) Tennessee Eastman Corp. took on the development of a method of extruding acetate and butyrate rigid sheet in thickness from 0.005-in. up. Individual extruders such as Joseph Davis Plastics Co., Arlington, N. J., E. T. Plastics Co., Columbus, Ohio, and others have carried this work forward with the result that today clear and colored acetate and butyrate sheet is being produced at prices which must be worrisome to casters of similar materials. E. T. Plastics Co. sells its sheet 28 in. wide, on the basis of 70¢ a pound for clear and $1.00 a pound for colored. Minimum order for color is 2000 pounds. Using only Tenite I cellulose acetate, the company is now supplying Borkland Laboratories, Marion, Ind., and others with material for blow forming. The E. T. sheet is extruded on a standard 2½-in. National Rubber Machinery Co. extruder through a die developed by the extruding company. The Davis concern has a similar proposition.

It appears likely that this type of dry extruded sheet can compete in blown toys with Japanese blown nitrate toys. At the Third National Plastics Exposition, the Tennessee Eastman Corp. demonstrated the forming of 0.020-gage acetate sheet on a Taber Thermo-draw hand press at remarkably high speeds.

If dry extruded acetate sheet can be profitably produced at such low prices, and if quality can consistently be maintained, it stands to reason that the big companies now casting such sheet will turn to dry extrusion in order to maintain their competitive volume. Celanese has been quietly develop-

First pure white vinyl hose to be marketed is this one offered by Extruders, Inc., Culver City, Calif.

ing extruded acetate sheet, not telling customers by which method it was produced, and now sells it in 0.030 and 0.050 gages at 70¢ a pound clear or colored—a price far below that of cast sheet. Eastman Kodak Co. also is extruding sheet. Monsanto and Du Pont will not be far behind. To the small company there is a hazard in competing with the big outfits on sheet. Machines are on the way which will turn out polished sheet at 200 to 400 lb. per hour.

Even if this sheet is not quite as clear, uniform, and glossy as the cast sheet for packaging purposes, in many applications it will prove satisfactory at its price.

In the extrusion of such sheet, with acetate at from 42 to 47¢ a pound to be converted and sold at 70¢ a pound, it is necessary that minimum extrusion volume be not less than 60 and preferably more than 75 pounds per hour per machine.

Just a few months ago, production of extruded sheet acrylic in thin gages was announced by Plax Corp. The material goes into lens forming, displays, and special fabrication in its 0.040 gage — a thickness not available in cast acrylic. Here is a material which costs approximately 70¢ a pound converted to sheet by extrusion to sell at about $1.30 a pound.

Modified nylon film was introduced very recently by Imperial Chemical Industries, Ltd. in England. Fully transparent, its thinnest form is 0.003-in. in which form it can be sterilized by dry heat with no damage. Its uses in England to date are chiefly in the medical field as wound dressing.

Newest extruded garden hose, by Industrial Synthetics Corp., Garwood, N. J., has rayon reinforcing center ply

Plastics garden hose

Hailed as both a problem-child and a miracle at the end of the war, and pooh-poohed by some of the rubber interests, vinyl garden hose came into its own in 1948. It is strictly a proprietary proposition in most cases involving formulation of material, testing, packaging, advertising, firm guarantee to users, and the use of considerable working capital to warehouse finished stock until customers are ready for delivery.

The vinyl garden hose field is no place for sissies. Not only is competition for improved quality and lower prices keen between the established makers, but every so often some chiseler hits the field with an inefficient hose produced from scrap to sell at bargain prices. The market was by this means so badly messed up a couple of times in 1948 that some of the bigger companies have been considering the establishment of minimum standards, not to support their guarantees but to confound chiselers.

The garden hose field is a beautiful example of low mark-up for conversion by extruding. Take the case of one 50-ft. hose retailing at $7.95. The retail discount of 40%, the cash discount of 2%, and a 10% commission to the salesman on the net brings the factory price of the finished hose to $4.20. Coupling and package purchased in huge quantities cost 38¢ per hose. So 50 ft. of hose weighing 6½ pounds is converted at $3.82 or less than 61¢ a pound. Only by compounding to his own account can the extruder get his virgin material cost down to 42¢ a pound. (Vinyls are now selling at 46 to 48¢ a pound.) Out of that 19¢ per pound margin — less than a 50% mark-up — must come labor, overhead, research, and office costs, as well as amortization of equipment, taxes . . . and profit.

The machinery on which garden hose is produced must be set up for months at a time for that purpose only. It must run at not less than 70% of capacity on a 168 hour a week basis. While vinyl garden hose has taken away from rubber fully 30% of the garden hose market and will probably take 50% in 1949, it is and will remain highly competitive and on a narrow profit margin basis.

The second article of this series, to be published in our January issue, will discuss extruded profiles for industry, pipes, and tubes.

Polystyrene is used to mold new powder puff packages which have desirable re-use value as handkerchief boxes, cigarette containers, or as holders for powder puff refills. A tight snap lock is obtained for the hinged units by means of a slight undercut in the mold

Powder Puff Packages

THAT daisy-fresh look so important to the exposed epidermis of fair females is maintained by a process of frequent but light applications of powder. The applicator is a small, generally circular puff made from velour, light flannel, or fluffed cotton. Production of these puffs runs into billions of units annually; packaging of them, particularly when sold as branded lines, has always been a problem.

Victoria-Vogue, Inc., New York, N. Y., large maker of powder puffs, has used clear plastic rigid sheets and films in packaging for some time. Recently, to stabilize public and trade appreciation of the quality of their products and to provide merchandising impetus, they turned to molded clear polystyrene. The whole idea was to provide packages which would have re-use value as handkerchief boxes, cigarette containers, or even to continue as powder puff holders, permitting better unit sales and encouraging good display on the part of the stores.

Taking advantage of an all-plastics molded-in hinge, patented by Columbia Protektosite Co. Inc., Carlstadt, N. J., Victoria-Vogue had three of its five new packages built around this hinge. It is applied to the square box, the horizontal cylindrical box, and the small single puff box, all shown above. The other two boxes—the vertical cylinder and the apple—have ledge-fitted tops.

Designs were worked out by Victoria-Vogue, Inc., and then turned over to the molder, who handled engineering, tooling, and production. All molds have multiple qualities and all were designed especially for polystyrene. High polish, fast flow, and narrow gating to cut down finishing time were the main factors involved. The big apple package is a three part job, top, bottom and stem being molded separately and the stem cemented to the top. All the other packages are two part jobs. Assembly of the hinged units is rapid; the top and bottom can be snapped together when the hinge arms are slightly flexed. A tight snap lock is obtained by means of a small undercut in the mold.

Five puffs in a cylindrical formed sheet acetate package used to sell at 50¢; the molded unit with its contents sells at 75¢—but the package has long re-use life as a cigarette box. The apple box, formerly made in glass, sold with contents at $2.75; in plastics the same unit sells for $1.00. Realizing the value of these new packages as re-use containers for more powder puffs, the company of course still merchandises line of refills in sheet acetate.

Hearing Aid Cell Housed in Vinyl

A black vinyl tape is wrapped around rigid vinyl case to seal openings on the sides and insure a long shelf life

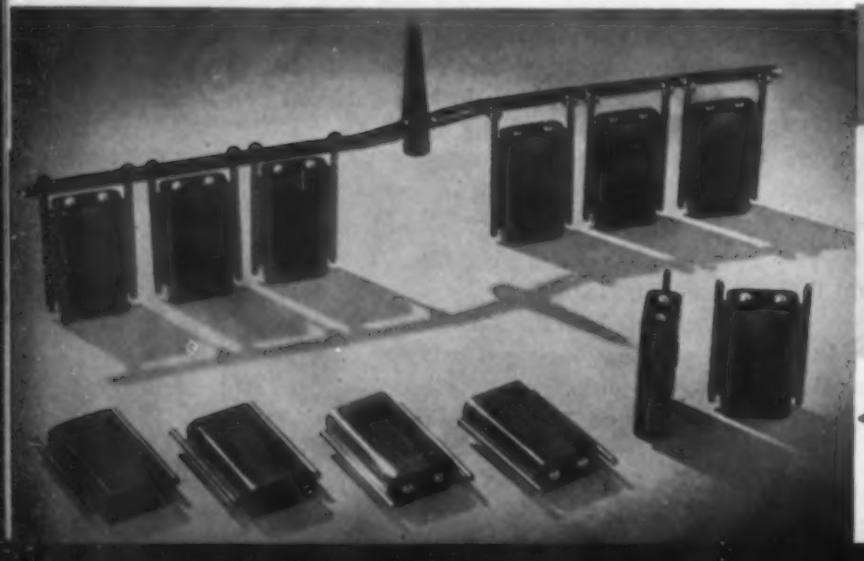
INCREASING the capacity of a dry cell without increasing either size or weight—or, still better, gaining increased capacity with a decrease in size and weight—has been the aim of dry cell engineers for many years. A few weeks ago, the National Carbon Co., Inc., New York, N. Y., announced a new dry cell known as the Eveready 1005-E Hearing Aid "A" Cell. This unit is less than ⅓ the weight and approximately ⅓ the size of a conventional type hearing aid cell produced by the same company with approximately the same ampere/hour capacity. Further, compared with another hearing aid cell of approximately the same size and weight, also produced by National Carbon, the new cell has approximately three times the capacity. Another advantage of this new cell is the constant voltage at which it operates during 90 to 95% of its useful service. All of these factors are of high importance in the hearing aid field.

The new cell differs radically from conventional dry cells. No metal oxides are used as depolarizers, this action being secured through the use of highly active, oxygen-sorbing, carbon electrodes. A stable gel-paste, supported by a fibrous mat, immobilizes the required electrolyte which—to all intents and purposes—is regenerated as used and so remains unchanged throughout the service life of the cell. The net total, therefore, of these reactions is simply that of "burning" the pure zinc anode in oxygen drawn from the air through the active carbon cathode.

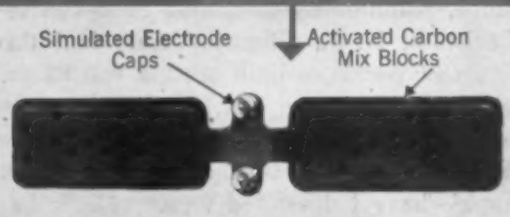
Less zinc required

Because of the construction of the new cell, shown on these pages, there is a great saving in zinc per ampere/hour capacity. In most standard cells the zinc anode is also the outside housing of the battery which, of course, is generally encased in cardboard or other protective covering. When the zinc is used as the outer case it must be sufficiently thick so that there is little possibility of any portion of the zinc housing "burning" through during the useful life of the battery, thereby permitting the electrolyte to escape. In the new cell, the anode is simply a strip of zinc in the center of the unit.

When it was first decided to put this new cell to practical test, it was necessary to find a housing ma-



1. Carbon Electrode Assembly (Positive)



Shot shows unusual gating required to prevent crushing of molded-in carbon cathodes, their connectors, and terminals

terial other than zinc which would have the necessary properties and yet would be practical from an economic standpoint. After investigating many materials, the National Carbon Co. finally decided to use Vinylite rigid molding compound made by the Bakelite Corp., another unit of Union Carbide and Carbon Corp. The results were satisfactory from every angle.

Ways and means were found so that the carbon cathodes, plus their connectors and terminals, could be used as mold inserts and molded into the cases as they were produced. The fact that the carbon cathodes are rather fragile, plus the need of molding their entire inside surfaces and a portion of the outside surfaces completely clean of plastic, made a complex problem of the mold design and gating method. At first, a single-cavity mold was produced and samples run, after which a two-cavity mold was produced. With this two-cavity mold the various problems were overcome until finally a six-cavity production split mold was engineered, incorporating all the knowledge which was gained from the original sample mold work.

Special gating employed

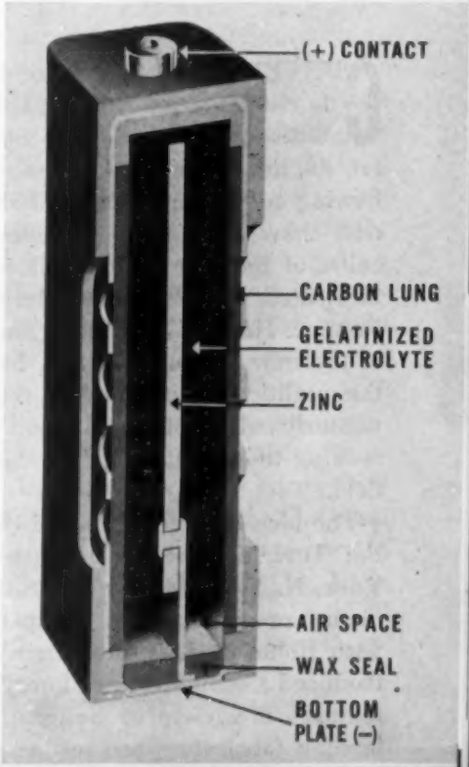
The method of gating is especially interesting. Two small round runners for each cavity are fed from the main runner. Each small runner, in turn, feeds a very thin web gate approximately 1⅝ in. long, or practically the entire length of the cell. This gating, plus slow injection, makes it possible to fill out each cavity perfectly without crushing the carbons or flashing into the portions of the cell which must be molded clean.

One of the accompanying illustrations shows the manufacturing steps in producing a complete cell. The fifth step is of particular interest to the plastics industry. The over-all height of the plastic case is great enough so that when the zinc electrode and the bottom plate assembly are placed in position in the battery (step No. 5) a portion of the plastic case over-hangs the bottom plate. A heat-forming operation is then used to roll over the excess wall of the case flat against the outside of the bottom plate, thereby heat sealing the various components into a single unit.

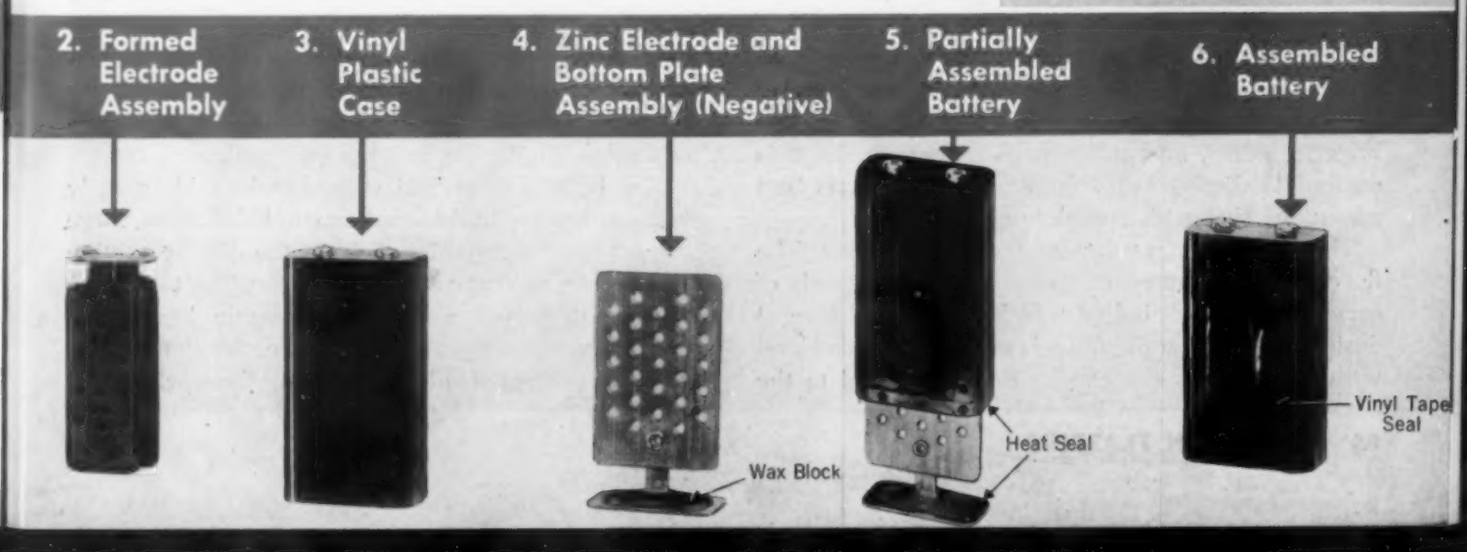
Sealed until used

Still another type of vinyl material is used in producing this cell. In order to insure a long shelf life, it is necessary to seal the openings in the two sides of the Vinylite case so that air cannot pass through the carbons to the electrolyte until the cell is placed in service. A black Vinylite tape, coated on one side with a pressure sensitive adhesive, is used to meet this requirement. This tape is stripped off just before the cell is to be used.

The manufacture of this cell is one more example of a product in which plastics materials have not been used as substitutes, have not been used to save money or to cheapen the item—but have been used because they are necessary components of a radically new type of dry cell.



In new cell, anode consists of zinc strip in center of the unit. In conventional type cells housings serve as anode



Show Cases in the Modern Mode

CURVED tops of transparent acrylic which help to eliminate reflection of light and allow a clear, undistorted view of the displayed merchandise are the newest things in the show case market. The flowing curves and variety of shapes in which these new show cases can be produced are possible because of the ease with which acrylic sheets can be fabricated. Miss Dorothea Marlor, Staff Designer of Rohm & Haas Co., Philadelphia, Pa., and originator of the new showcase design, based her thinking on the qualities of acrylic which make the material particularly adaptable to the job rather than merely seeking to copy standard practices in the show case field.

The idea has been followed through by Miss Martha Turi, designer with Just Plastics, Inc., New York, N. Y., under the supervision of Charles Vermann, president. That company, working closely with Rohm & Haas, producers of Plexiglas, has introduced a standard line of acrylic show cases which features a variety of designs; a number of other leading fabricators are setting up to produce cases of the same type.

It is believed that the acrylic show cases will be especially suitable for department stores, jewelry stores, shoe and accessory shops, china shops, fine lingerie stores, and other such places where it is desired to display valuable merchandise to its best advantage, yet with complete protection.

The case itself consists of three basic parts. The floor stand is formed of varied shapes and rods of acrylic sheet stock bolted together in one of several designs. A wooden platform is attached to this stand with metal bolts; the acrylic cover is bolted to the platform through its flanged edge with a combination bolt which is plastic on the visible end and metal on the other. It is possible to attach the acrylic top to the platform with hinges for easier accessibility. In such a case, the hinged top is locked to the platform to assure a tamper-proof display.

Free blown domes

The domes of the show cases are formed by free blowing heated acrylic sheet stock, usually ¼ in. thick, into the desired shape and size by the use of a jig and air under pressure. Several different shapes are possible—including circular domes, tear drop styles, kidney, rectangular or oval shapes—to conform with the specific demands of architects, display men, interior decorators, and so on. The largest size top possible to make is about 9 ft. in its longest dimension, the limit being placed by the fact that the largest acrylic sheet available is 100 by 120 inches. Standard sizes and shapes are kept in stock.

The new cases are light enough in weight to be easily moved about—acrylic weighs less than half as much as glass—and there are no bulky bases. It takes a long enough time to remove the bolts attaching the cover to the platform to discourage petty thievery, yet a short enough time to make it possible to change the display quickly and easily.

The beauty of crystal clear acrylic adds greatly to its suitability in this application. In addition, there are no bars or partitions within the display section to interfere with the customer's view. The toughness and shatter-proof qualities of acrylic have been proved many times; for example, by its use in airplane noses and "blisters" during the war.

Blown acrylic domes show off, yet protect merchandise. Acrylic sheets and rods form interesting bases for cases

On the other hand, acrylic is softer than glass and therefore is more subject to scratching. However, because of this very property of acrylic, minor scratches can be removed by polishing with a special plastics wax. Deeper scratches, which will not yield to a simple polishing treatment, can be removed by the use of a portable buffing wheel. A sales clerk or stock man can readily acquire the necessary technique for such polishing.

One of the advantages of these show cases is that the danger of scratching is partially eliminated because of the curvatures; handbags and other such objects which might scratch the acrylic surface cannot be placed on the curved tops.

Thus far, the plastic cases have been planned for display purposes only, the actual stock to be carried elsewhere in the store; however, they can easily be designed as display and selling cases, with drawer or other storage space in the base, as illustrated in the accompanying sketches by Miss Turi.

Other future possibilities for this new idea in show cases are numerous. The blown covers can be supplied for application to shadow box or wall displays. Here, again, plastic and metal bolts would be used to attach the flanged edge of the dome to the wall or other section.

Special lighting effects

In certain instances where special lighting is desirable to display merchandise more effectively, a translucent acrylic sheet may be used to replace the wooden platform. Fluorescent lighting tubes placed beneath the translucent sheeting give a pleasantly diffused illuminating effect without the need for cumbersome external lighting fixtures.

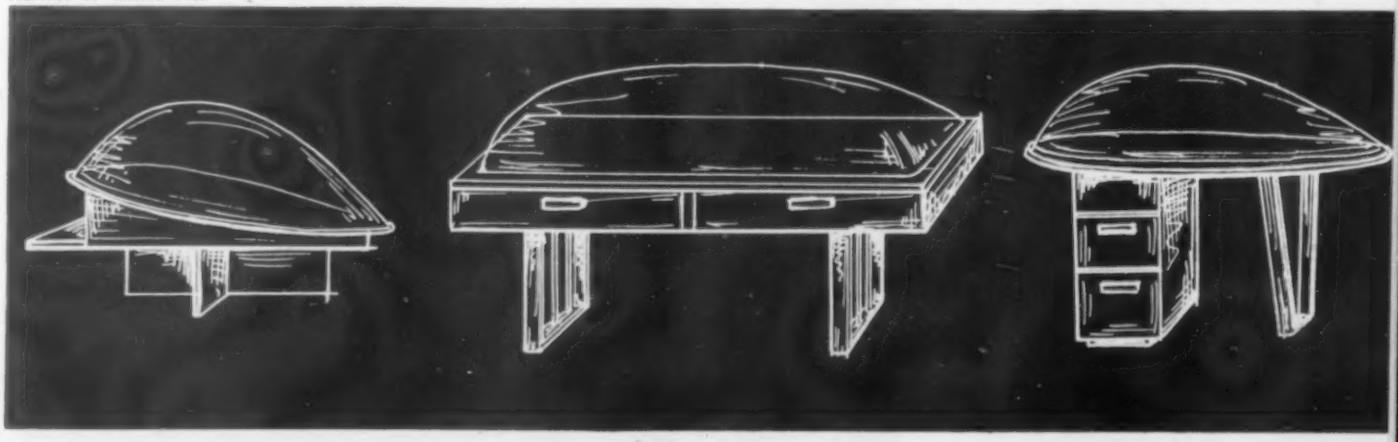
Because of the design of these new show cases, it is possible to have only a single base on which various shaped tops may be placed in accordance with the particular type of display involved. In other instances, display men may prefer to use their own tables or bases and to procure only the blown acrylic domes. Attachment would be made in the same manner as with the plastic covers and the regular bases.

Display cases of this type are advantageous in large stores where it is frequently desired to change the direction of customer traffic in the sale of seasonal goods. Because the cases are relatively light in weight and easily moved about, they can be placed at strategic points where they will serve as traffic diverters or guides. For example, two pear or kidney shaped domes might be placed to form an aisle leading towards an exit or to form a path which would psychologically beckon the customers to another department.

Far sighted architects and store interior decorators are making rapid strides in modernizing merchandising methods. In these new show cases, they have an inspiring tool with which to work. The basic concept is so flexible that the possibilities in certain applications appear to be limited only by their imaginative talents.

Drawers or other types of storage space can be incorporated in bases for different size and shape plastic show cases

SKETCHES BY MARTHA TURI



A one-piece phenolic molded case and amount keys injection molded of cellulose acetate butyrate in two colors are among features of new adding machine

PLASTICS IN ADDING MACHINES

How — and why — one company developed phenolic housings and butyrate keys to meet competition successfully

IT is always of interest when a new company enters a highly competitive field of business, and especially so when it decides to use plastic materials to make its product outstanding among others. A case in point is the adding machine field. These mechanisms have been produced for many years and hundreds of thousands of dollars have been spent for advertising to link certain company names closely with their products. The Clary Multiplier Corp., Los Angeles, Calif., was fully aware of this situation when it decided to produce a line of adding machines. To meet competition it was obviously necessary that the design of the new machines be such that their appearance, simplicity of operation, and sturdy construction, would serve as selling points to aid in overcoming the headstart which competitors were enjoying.

There are two major plastic units used by Clary in its machines—the housing and the amount keys which, through an unusual design, also serve as a cover for the opening in the case.

In choosing a material for the housing, the company's engineers investigated both metals and plastics in order to weigh the relative advantages and disadvantages of each. The final choice of a plastic material hinged upon the ability to mold shapes which would be difficult to draw in metal, plus the possibility of molding the part in the finished color or, falling short of this, to mold this housing with a surface finish that would require a minimum of preparation for subsequent painting.

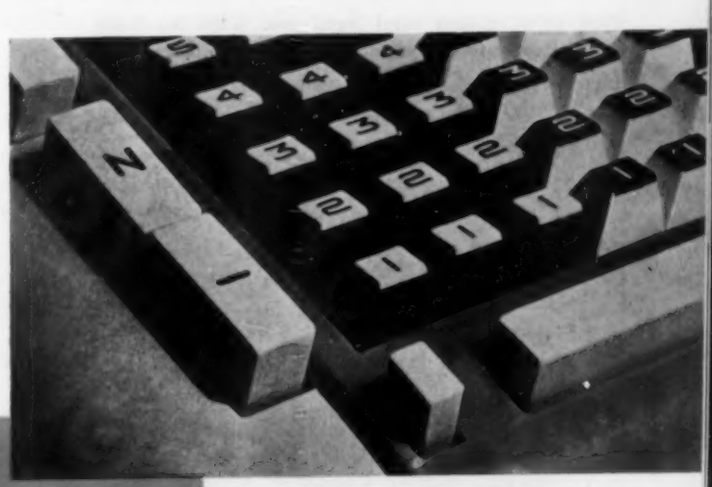
After having decided that plastic would be the material for the case, it became necessary to determine the particular material to be used and the

method by which it would be molded. Since tolerances had to be fairly close around the keyboard section, dimensional stability was of relatively high importance. The company's engineers felt that the safest production technique for a housing of this size seemed logically to be compression molding of a thermosetting material. Their objections to the use of a thermoplastic material centered around the fact that an injection molded casing of such large dimensions might limit the potential sources of supply.

Two-toned housings

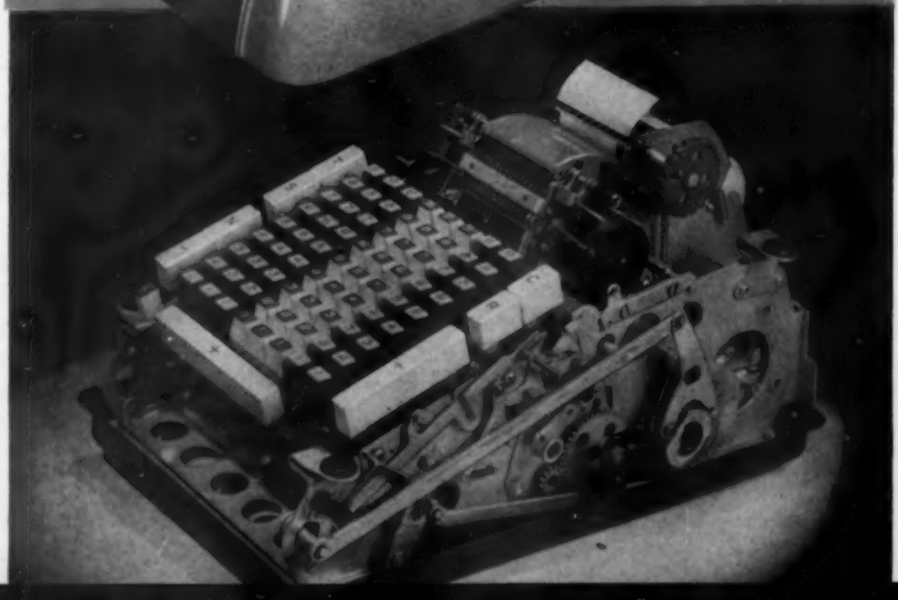
The design of the adding machines called for two-tone housings in light colors, made of a material of relatively high impact strength. Because of cost factors, phenolics were the only thermosets that could be considered. However, phenolics in light colors do not have either sufficient color stability or high enough shock resistance for the purpose. Furthermore, because of the two-tone color requirement, it would be necessary to use paint for at least one of the two shades no matter what material was used. It was decided, therefore, to settle on a black phenolic shock resistant material and to spray paint the housing to obtain both of the two color tones required. It was specified that the paint be baked under infra-red to produce a durable finish. The cases are supplied to Clary by Auburn Button Works, Auburn, N. Y., McDonald Manufacturing Co., Los Angeles, Calif., and Remler Co., Ltd., San Francisco, Calif.

The other plastic element in these adding machines is found in the keyboards. Plastics, of course, have been used in keys of adding machines for many years. However, Clary is reported to have pioneered the use of two-tone plastic molded parts in their keytops, the first of two major improvements incorporated in this job which involved not only a new development in keytop design but also required a special injection molding process. The company feels that the process provides a distinct advantage



Amount keys are molded with sloping sides—wide at the bottom, smaller at the top. They serve as a cover for the keyboard; little dust can get between them

Phenolic case is constructed to withstand plenty of abuse. However, if cracked by a smashing blow, it can be easily replaced



Plastic case "floats" on rubber mounts. These mounts, coupled with case lining, serve to soundproof the adding machine

Vinyl cover replaces usual metal one. When not being used, it can be folded compactly and kept in a desk drawer

Case and keyboard protected mechanism of adding machine so well during fire that only minimum servicing was needed

in permanency of contrast between the number and its background, as well as a lower manufacturing cost.

Keys form cover

The second improvement is a novel keytop design which involves shaping the base of each amount key in such a way that the keytops themselves form the machine cover over the area of the keyboard. The cost of a cover was therefore saved and at the same time the design effected a reduction in tolerance requirements for the housing itself. All of this resulted in an over-all clean-cut appearance as well as providing a satisfactory means of keeping dust from reaching the mechanism.

In producing the Tenite II cellulose acetate butyrate keys and control bars for this machine, the Electric Manufacturing Co., San Francisco, Calif., makes use of a double-injection molding process. In molding the control bars, one color is first injected to form the body of the bar, with the letter cavity in it. After that has hardened, a second color is injected to form the letter itself. In molding the amount keys, one color is first molded in order to form the keytop. In this first molding operation, the force plug in the mold has a raised numeral which molds through the cap. In the second molding operation, when the force plug has been removed from the cap the contrasting color not only forms the base but also flows into the open space in the cap to form the numeral.

Two molding operations

Both types of moldings are made in two molding operations in that the parts molded in the first operation are removed and used as inserts in the second mold. Both keys and control bars are designed so that they are assembled by means of a press-fit onto metal shanks which extend upward from the adding machine mechanism.

As the photographs show, the grey and white colors of the keys are used alternately—grey numerals in some columns and white in others. Thus visual separation of columns is produced: the cents column keys have grey numerals, the dollar keys have white, and the thousand dollar column is in grey. The color contrast gives instant recognition of the decimal position. The tops of the keys are shaped to provide a comfortable "feel" for the fingers and the smooth, satin finish of the butyrate plastic eliminates glare. All of these seemingly minor points, made possible through plastics engineering, add to the operating efficiency of the machines.

Instead of the usual drawn metal storage cover for these machines, 0.008-in. transparent Vinylite sheeting was specified. These covers could have been produced at lower cost by heat sealing the seams, but the designer decided that sewn seams making use of a binding of vinyl would add to the smart appearance of the completed job.

Although these adding machines were only placed on the market in April 1946, sales have been most gratifying and experience to date proves that the choice of plastic materials for the housings and keyboards have helped to produce units which give highly satisfactory performance.

One of the photographs shows a Clary adding machine which was inside a building that burned down. The phenolic case protected the mechanism so well that the machine still operated after the fire. It was only necessary to install a new case, a new keyboard, and a new cord, to make the machine as good as new in appearance.

Heat-Resistant Polystyrene

by E. Y. WOLFORD*

WITH United States production of polystyrene expected to pass the 130,000,000-lb. mark this year, new types of this material, shown at the Third National Plastics Show, are expected to push demand even higher in 1949.

The Chemical Div. of Koppers Co., Inc., believes that it has made an important contribution to the plastics industry with its new P-8, a high heat-resisting, low-shrinkage polystyrene with a number of important characteristics which have long been sought.

Important advantages obtained

The introduction of P-8, now available in limited quantities, brings these advantages:

1. Heat-resistant polystyrene of superb crystal clarity.
2. Polystyrene in an unlimited range of colors which fade negligibly when immersed in boiling water.
3. Unvariable color formulation when a crystal polystyrene is used as a base.
4. Heat-resistant polystyrene which is as moldable as general purpose polystyrene.
5. Molding cycles shorter than with polystyrenes of other types.

An additional factor of importance to the molder is the announcement that the new material will sell at the same price as general-purpose polystyrene.

Behind the new P-8 development is a story of development carried on jointly by development men of the Koppers Chemical Div. and the Koppers Research Dept. Using a combination of complex theoretical analysis and pure fundamental research, these men devised a special process for hooking molecules of styrene, the principal ingredient of polystyrene, into long molecular chains and into various chain-like formations. Through the new process, it was possible to set up more precise control of molecular formations than previously attainable. It became practical to standardize production of polystyrene in the chain forms having inherent qualities of heat-resistance, low shrinkage, moldability, and crystal clarity.

Koppers entered the commercial polystyrene field in 1946, prepared to supply two of the three types now recognized. In Type P-3, the molder could obtain the lubricated type. For his general-purpose applications, the molder was offered Type P-7. The latest forward step in the program is the availability of heat-resistant polystyrene Type P-8.

Measuring heat resistance

The recognized measure of the heat resistance of the three types is known as Method, Designation: D648 of the American Society for Testing Materials. In this method, a molded polystyrene bar ½ in. wide by ½ in. deep by 5 in. long is supported on 4-in. centers as a beam. It is loaded vertically in the middle by a weight of 5½ lb., giving a maximum fiber stress in the beam of 264 p.s.i. It is heated by immersion in a heated and stirred oil bath, in which the temperature is raised at the rate of 3.6° F. per minute. By a dial gage, the amount of deflection is observed, and the temperature at which the displacement reaches 0.010 in. is reported as the heat distortion temperature.

According to the book, "Technical Data on Plastics," recently revised and published by the Plastic Materials Manufacturers Association, the lubricated type of polystyrene has a heat distortion temperature of 170 to 180° F. (Koppers specification, 175 to 185° F.) General-purpose polystyrene

*Manager, Plastics Development, Chemical Div., Koppers Co., Inc.

The Author: **E. Y. Wolford has recently been promoted to manager of Plastics Development for the Chemical Div., Koppers Co., Inc.**

A native of Norristown, Pa., Mr. Wolford was graduated from the University of Pennsylvania as Bachelor of Science in Chemistry, received his Master of Science degree from the University of Pittsburgh, and later earned the degree of Chemical Engineer from the University of Pennsylvania.

He joined Koppers Butadiene Div. early in 1942, and shortly thereafter was placed in charge of styrene production at the Kobuta plant. When Koppers formed a separate Chemical Div. in 1946, Mr. Wolford joined the Sales Development Section of that division as plastics engineer.

General-purpose polystyrene container shrank after 10 min. in boiling water; heat-resistant polystyrene piece did not

has a heat distortion temperature of 180-190° F. (Koppers specification 190 to 200° F.) Polystyrene with a heat distortion temperature of 200 to 210° F. is designated as "Heat-Resistant Type."

Development of heat-resistant quality

When working on elastic polymers, Lebedef early remarked that the basis of good polymer was pure monomer. This, of course, applies to polystyrene. So efforts were exerted to free liquid styrene monomer of all inert aromatics, such as ortho-xylene, phenyl methyl carbinol, or ethyl-benzene. Some time later it was discovered that by the analytical methods of that day, styrene monomer of 102% purity was being obtained! Further investigation revealed the presence of unexpected impurities such as phenyl acetylene, benzaldehyde, and formaldehyde.

Once styrene monomer of high purity was obtained, its conversion into polystyrene of the present superior physical properties presented many problems. The first large laboratory samples of polystyrene produced in the United States were molded by the author, and found to crack or craze within a week after molding while merely standing on a shelf. This effect later became known as "monomer disease," traceable to incomplete conversion of monomer to polystyrene. Such polystyrene had a low heat distortion temperature and low physical properties. It was almost as low-melting and brittle as good rosin, and much more expensive. These drawbacks were corrected by polymerization methods which increased the average molecular weight of the polymer. Unfortunately this fruitful advance cannot be carried to the point where polystyrene has the properties of steel because, beyond a certain point, increase in average molecular weight no longer enhances physical properties.

The increased molecular weight idea was fully appreciated and exploited about 10 years ago. Today, all commercial polystyrenes have average molecular weights high enough to insure superior physical properties, which would not be notably greater even if the average molecular weight were 10 or 100 times greater. So improvement of physical properties had to be sought along other lines, and this was just what our company did to develop and produce heat-resistant Type P-8.

Dimensional stability in boiling water

Both lubricated polystyrene Type P-3 and general-purpose polystyrene Type P-7, produced by the new commercial process which Koppers pioneered, have the clarity and colorlessness so essential to crystal polystyrene. Flexibility of polystyrene, long considered a brittle thermoplastic, is enhanced in P-3 and P-7. Electrical properties are of the usual excellence expected of polystyrene. But, most important, the availability of polystyrene P-7 has raised the heat distortion temperature specification to a new high for the general-purpose type.

Despite the raised heat resistance of the general-purpose type, cautious molders continued to stamp their molds with such phrases as "Wash in warm water," and "Do not rinse in boiling water." Thus the user was warned on polystyrene injection molded pieces of the limited heat resistance or dimensional stability at elevated temperatures.

When the plastic is squeezed into the mold cavity, the surface of the plastic mass freezes into a rigid layer almost instantly, but the core is still filled with hot, soft plastic which shrinks as it cools within its rigid surface case. The case is unable to shrink as much as the core shrinks. In thick pieces, this differential shrinkage sometimes causes vacuum bubbles to form. In thinner pieces, the cohesive forces of the plastic are strong enough to resist actual disruption. But the differential shrinkage stresses still exist in the rigid plastic. In some cases —for example, brush backs—in which the skin of the molded plastic will later be broken by drilling holes for bristle tufts, it is usually necessary to anneal out the differential shrinkage stresses, just as glass is made less fragile by annealing. But in most cases, polystyrene is not annealed, and heat gives the stresses the opportunity to upset dimensional stability, as for instance when the piece is immersed in boiling water.

So here is the point where P-8 comes in with its higher heat distortion temperature and its increased heat resistance which really show up on immersion in boiling water. By A.S.T.M. D648, P-8 ordinarily shows a heat distortion temperature of 204° F. or better, but it must be remembered that this is with the piece slowly heated and carrying a 264 p.s.i. maximum fiber stress under the pressure of a 5½ lb. load. When the piece merely supports its own

Properties of Heat-Resistant Polystyrene Type P-8

Properties	*Units*	*A.S.T.M. test*	*Koppers Type 8*
Physical and mechanical			
Specific gravity		D792-44T	1.05-1.07
Tensile strength	Lb./sq. in.	D638-46T	8500-9500
Elongation	% in 2 in.	D638-46T	1.0-2.0
Compressive strength	Lb./sq. in.	D695-44T	12000-13500
Flexural strength	Lb./sq. in.	D650-42T	12000-13000
Impact strength (Izod)	Ft. lb./in. notch	D256-43T	0.3-0.45
Hardness	Rockwell M scale	D785-44T	76-80
Deformation under load	%, 77° F.	D621-44T	0.2-0.26
Electrical			
Dielectric constant			
60 cycles		D150-47T	2.55-2.58
10^3 cycles		D150-47T	2.40-2.42
10^6 cycles		D150-47T	2.40-2.42
Power factor			
60 cycles		D150-47T	0.0001-0.0002
10^3 cycles		D150-47T	0.0001-0.0002
10^6 cycles		D150-47T	0.0001-0.0002
Dielectric strength	Volts/mil	D149-44	590-630
Volume resistivity	Ohm. cm.	D257-46	10^{17}-10^{19}
Surface resistivity	Megohms	D257-46	3.4×10^7
Arc resistance	Seconds	D495-42	70-130
Optical			
Light transmission	%	D791-44T	88-90
Refractive index	n_D^{25}	D542-42	1.585-1.60
Thermal			
Heat distortion temperature	° C.	D648-45T	93-99
	° F.	D648-45T	200-210
Linear coefficient of thermal expansion	Per ° C.	D696-44	7.83×10^{-5}
	Per ° F.	D696-44	4.35×10^{-5}
Flow Method I	° C.	D569-44T, Proc. A	122
Method II	Secs. to flow 1½ in.	100 p.s.i., 135° C.	266-276
Mold shrinkage (Injection)	In./in.		0.002-0.006
Stability			
Water absorption	% 24 hr.	D570-42	0.05

weight, boiling water does not quickly soften the plastic enough that the stresses can warp it materially.

Comb teeth are particularly sensitive to heat distortion as they have little mass, large surface, and generally contain strong molding stresses. Yet combs made of polystyrene Type P-8 are distorted so little from immersion in boiling water for 15 min., that they are still usable.

Tea strainers made of Type P-8 in crystal and opaque red and ivory have been immersed in boiling water for an hour and come out in usable condition. Moreover, the red is still a bright red and the ivory unfaded. The crystal was very slightly frosted. Similar tea strainers were then immersed in boiling water for five hours. Even after this extreme exposure, the tea strainers, although somewhat shrunken, came out in usable condition with unfaded colors.

A 6-in. pocket ruler immersed in boiling water for ½ hr. shortened less than 1/64 in. per in., or less than 1½ percent. On immersion in boiling water for 7½ hr., the ruler shortened 1/16 in. per in., or

Contrast between two types of polystyrene after 15 min. in boiling water. Heat-resistant material was not affected

approximately 6% under this extreme exposure.

While no one will intentionally boil radio cabinets, resistance to distortion on immersion in boiling water for various time intervals is one way to measure comparative heat resistance. So two radio cabinets made in the same mold were immersed in boiling water. In 3 min. the one made of good general-purpose polystyrene was visibly distorted and after 10 min. it was so twisted, warped, and shrunken as to be unmeasurable—there were no straight lines to measure. The cabinet made of P-8, after 10 min., was only slightly warped. The distance across the back opening, which had measured 9 in. at the start, was unchanged; the average change of three measurements vertically across the back opening, originally 7 in., was 0.8 percent. Changes in surface appearance and ivory color were unnoticeable.

As to stability of color on immersion in boiling water, it has already been mentioned that kitchen red polystyrene Type P-8 remains a bright red. There is no tendency to fade to pink. A black radio cabinet made of P-8 was immersed in boiling water for 10 min. and remained a good jet black.

The above does not indicate that Type P-8 can be called a "boilable" polystyrene, because some dimensional changes occur as described. However, it is safe to say that articles molded of Type P-8 can be immersed in boiling water for reasonable or even protracted periods and still remain usable after much exposure. In this connection it should be mentioned that Type P-8 is not a copolymer but is still polystyrene. While "boilable" polystyrene will probably have to await the commercial availability of a suitable copolymer or substituted polystyrene, the fact that P-8 is polystyrene is of importance in its applications such as kitchen utensils, refrigerator dishes, spoons, bowls, and the like.

A governmental agency has approved the use of polystyrene in intimate contact with food for human consumption, and millions of polystyrene spoons have been made for the government for use in packaged rations. As P-8 is polystyrene, there is no question about its safe use in contact with food, and the increased heat resistance of P-8 allows the use of boiling water, or even a short steam puff for drying the contents of an automatic dish washer without destroying the usefulness of the article.

Heat-resistant polystyrene radio cabinet only warped 0.8% after 10 min. boiling. Other housing was hopelessly twisted

Moldability of P-8

As several instances of pieces molded from P-8 have been mentioned above, it is obvious that this new material has easy moldability, even though heat resistance is increased. To be specific, this material has been molded in crystal or colors in pieces so light and small as to take 400 to 500 to weigh a pound, on up through combs and tea strainers, to radio cabinets and even heavier shots. These pieces illustrate all shapes of cavities, flow patterns, gatings, section thicknesses, and large or small projected areas. In no case has there been any complaint on moldability; in fact, molders are more than well pleased with the moldability of P-8 polystyrene.

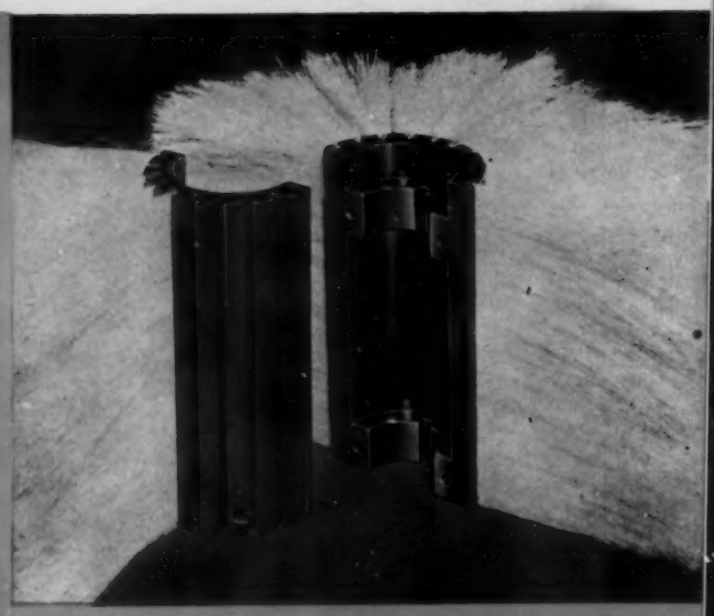
Injection cylinder temperature for P-8 needs to be 25 to 50° F. higher than with general-purpose type polystyrene. Molding cycle has been as short as, or shorter than, with general-purpose type polystyrene. In fact, on one radio case, cycle time was cut 10 percent. Fill-out of mold has required only the same pressure as with general-purpose type, so P-8 does not strain the machine or distort the mold, as the raised cylinder temperature fully compensates for the higher heat resistance. Weld lines have been equally inconspicuous and welds equally strong where they occur around cores. Release from mold has been good in every instance; in fact, in one case where zinc stearate had been mixed into the pellets of general-purpose type polystyrene, zinc stearate powder was not needed with P-8. Appearance of the pieces has been excellent.

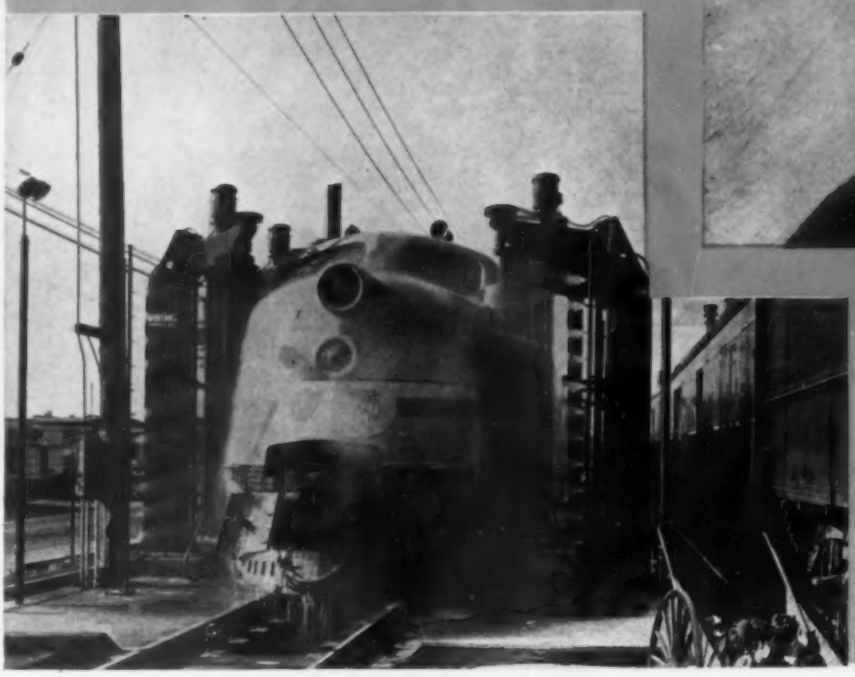
In short, if the molder will run P-8 at a little higher temperature on the cylinder, and in some instances on the mold, he can get pieces of as good appearance and strength with higher heat resistance, with fewer rejects, in less time. All this means savings in time and material, and reduced cost plus greater heat resistance.

Of course, the use of P-8 is not indicated in every application. For thin, large-area pieces such as refrigerator trays, crispers, or panels, where heat resistance is not especially needed, lubricated type polystyrene should still be specified. General-purpose type polystyrene will continue to be used in those applications for which its properties give complete satisfaction. But Koppers P-8 will open up new fields of use where greater heat resistance is mandatory or desirable.

Railway Car Washer

uses brush holders molded of phenolic





Two-piece permanent core molded of phenolic holds 20 brush strips which can be replaced in a matter of minutes when worn out. Phenolic was selected because of its dimensional stability, strength, and chemical resistance

Washer, through which railway cars or busses can be driven, consists of a series of water sprays and revolving brushes mounted vertically on two shafts spaced coach-width apart

BRUSH maintenance worries on a mechanical car washer have been practically eliminated through the use of newly engineered brushes and brush holders, the latter being molded of phenolic. The washer, manufactured by the Whiting Corp., consists of a series of water sprays and revolving brushes mounted vertically on shafts. Railroad cars and busses are driven between two sets of these shafts, where they are thoroughly washed and cleaned by the combined action of the water and the moving brushes.

Removable bristle units designed

Wooden cores with bristles fastened permanently in place were originally used by Whiting. In cooperation with the Fuller Brush Co., a strip was developed to hold removable bristles which could be fastened into a groove. This makes it possible to supply a permanent core into which new bristle units can be fitted as old ones wear out. Because of its tendency to split and to change dimensions when exposed to water, wood was deemed unsuitable for the permanent-type core.

Since a rather strong washing solution is used in conjunction with the washer, a non-corrosive material was required for the cores. Stainless steel, monel metal, phosphor bronze, brass, aluminum, and other metals were considered but were found to be too high-priced and too heavy for the application. Weight was an important consideration, since the 9-in. long brush holders are often stacked 14 high on a shaft.

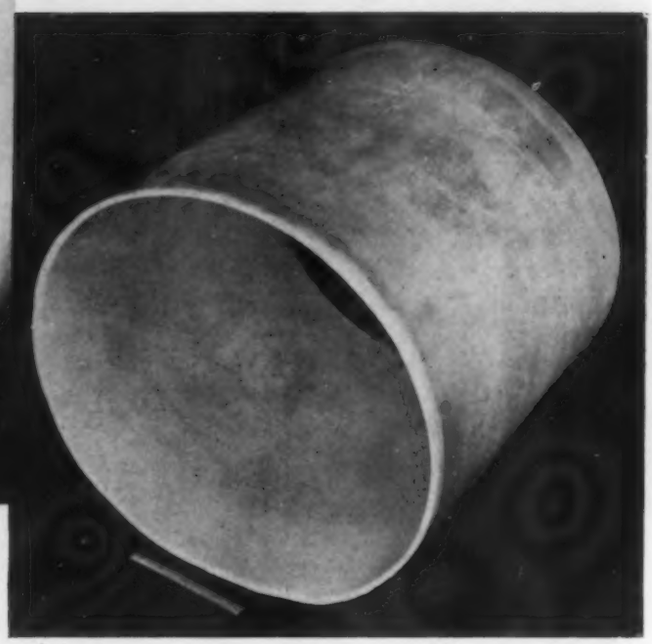
It was then decided to try plastics for the application. In cooperation with the Plastics Div. of General American Transportation Corp., a brush holder was designed to be molded of Durez phenolic plastic. The molded parts are 50 to 60% lighter than aluminum and cost less than 20% as much. No machining is necessary as the parts are molded to very close dimensional tolerances, which permit complete interchangeability. The immunity of phenolic to water and mild alkalies and its strength and impact resistance were other good properties.

As can be seen in the photographs, the core is molded in two halves and holds 20 Fullergript brush strips. Brass inserts are molded in and brass cap screws lock the core around the 2¼-in. double-keyed shaft. Greater control over the density of the bristles may be maintained with the new brushes, and replacements may be made in a few minutes.

Polyethylene for

PHOTOS, COURTESY ROCKWELD LTD.

A mild steel tank which has been lined with ⅛-in. polyethylene sheet. All joints are welded with hot gas torch



Forty-inch polyethylene cylinder, used in the heavy chemical industry as an acid tower lining, is centrifugally cast

THE use of polyethylene for chemical plant equipment in Great Britain is proving of increasing importance. To meet the demand, Rockweld Ltd., Commerce Way, Croydon, is producing specialized pipes, cylinders, flasks, etc., for the chemical, textile, metal plating, and brewery trades. This equipment is able to withstand the corrosive action of acids and alkalies, greases, solvents, and many types of gases.

Pipes and cylinders from 2 to 60-in. bore with a wall thickness of 3/16 in. for the 2 in. and of 1 in. for the 60-in. bore are now being manufactured, while ducts with 30-in. bore are supplied to the heavy chemical industry. The large diameter cylinders are proving of value as linings for electrolytic cells, acid towers, vats, and tanks. Fittings made from polyethylene include couplings, valves, tees, and crossover joints. Equipment of special design, such as revolving meter wheels up to as much as 3 ft. in diameter for use with highly corrosive acid, are now being made of this thermoplastic. Buckets of all types are made by centrifugal casting, as are also containers in 2, 5, and 10 gal. capacities for storage and transport of acids, alkalies, and general chemical solutions.

Centrifugal casting method

The casting process enables large pieces of equipment to be produced with greater strength, stability, and accuracy than can be obtained by forming from sheet material. The method consists of rotating a cylindrical metal mold through a horizontal or vertical axis. The mold is charged with a known weight of polyethylene granules and rotated at a sufficiently high speed so that the granules are flung against the wall of the mold to form a powder lining. At this stage heat is applied to the rotating mold so that the granules fuse in situ and there is no movement of molten polyethylene relative to the rotating cylinder. After fusion is complete, the rotating mold is cooled until the polyethylene solidifies.

The optimum temperature of the mold is approximately 200° C., since below this temperature there is some difficulty in securing complete fusion of the polyethylene and above this there is always the risk of oxidation or burning.

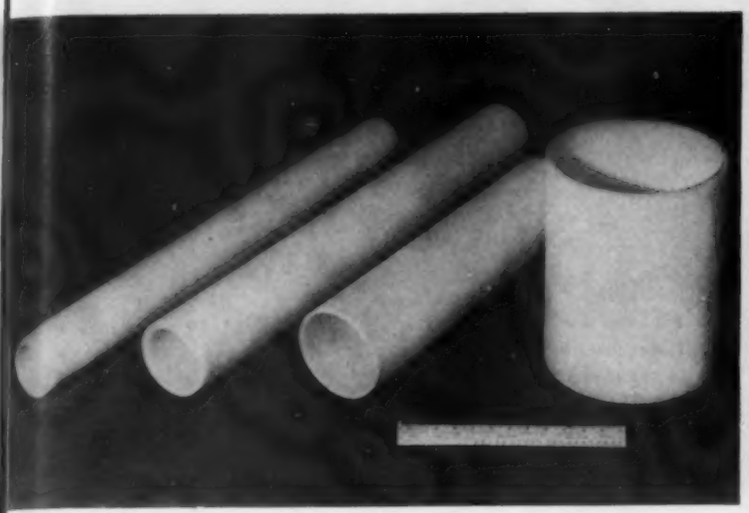
Rotation of the mold is maintained at the highest possible r.p.m. consistent with true running and freedom from bounce. For a 2-in. bore pipe a speed of 1000 r.p.m. has been found very satisfactory, while for a 30-in. bore a speed of 70 r.p.m. is considered an optimum rate.

The advantages of centrifugal casting of polyethylene may be summarized as follows: 1) Large tubes and cylinders can be made very economically since mold costs are low and no expensive equipment is required. 2) Cylinders which are truly concentric and of uniform wall thickness can be produced. 3) Centrifugal casting eliminates waste.

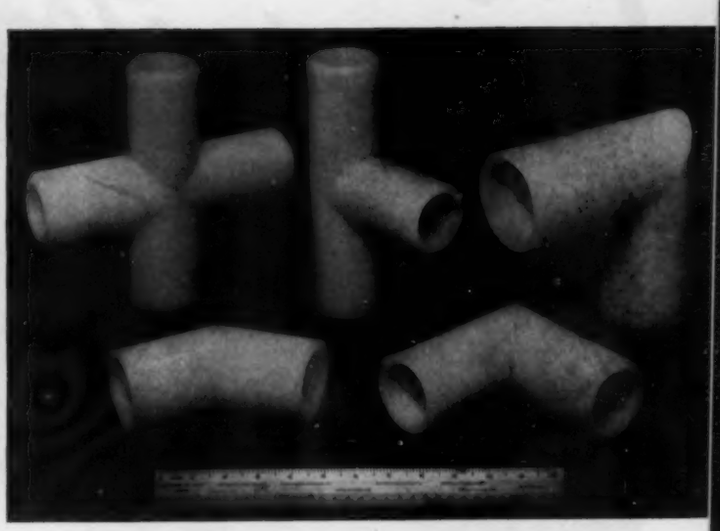
The disadvantage of this method is that, in tube making, only short lengths can be produced.

Techniques of joining polyethylene have now

British Chemical Plants



Centrifugal casting of pipes and cylinders gives uniform wall thicknesses, economical production as mold costs are low, and elimination of waste

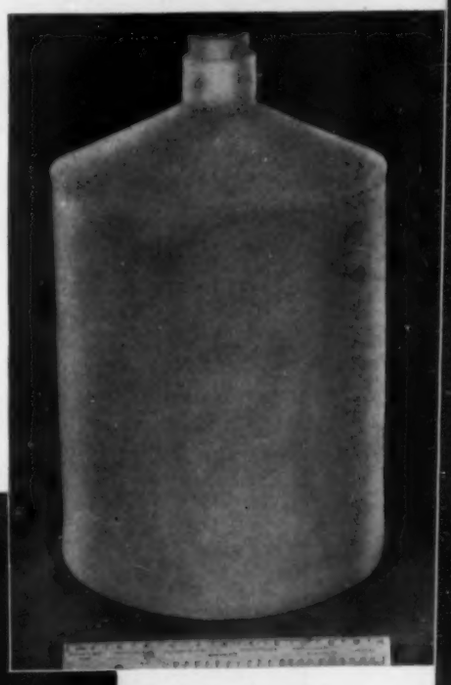


Pipe fittings of polyethylene—elbows, tees, and crossover joints—increase the uses to which pipes of the same material can be put

been evolved which give good results. For joints in pipes, welded butt joints have been found most satisfactory; other types of joints include sleeve and mechanical joints. In England, welded joints and welded bases for buckets and other types of containers are made with the Rockweld hot gas torch. In this torch, the heat source is nitrogen since heated polyethylene tends to oxidize in air. The nitrogen is fed through an electrically or gas heated welding torch and the temperature of the hot nitrogen measured ¼ in. from the nozzle is 250 to 280° C. The edges to be welded are usually chamfered to give an included angle of 60° and held rigidly with a gap of approximately 1/32 in. between them. The filler rod tip of polyethylene (⅛-in. circular cross section) is held in the hot nitrogen stream. When fusion occurs the molten tip is pressed into the gap and fed along the line.

Tank linings

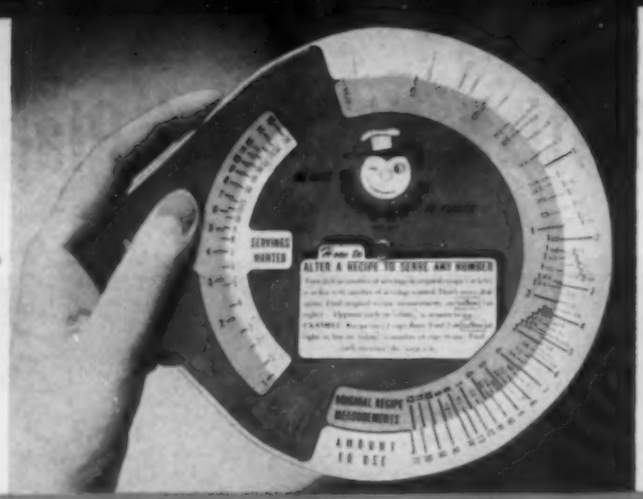
Experimental work carried out on tank linings using ⅛-in. sheet polyethylene with welded joints has proved so encouraging that a number of large chemical firms are now placing orders. There are practically no limits to the size of tank that can be lined with polyethylene and, provided the joints are sound, long life can be assured. Generally speaking it is inadvisable for the lining to be exposed to temperatures exceeding 65° C.; otherwise distortion is likely to take place due to high thermal expansion. Large tanks of circular section in capacities of 500 gal. and larger have been successfully lined in Great Britain.—*John S. Trevor.*



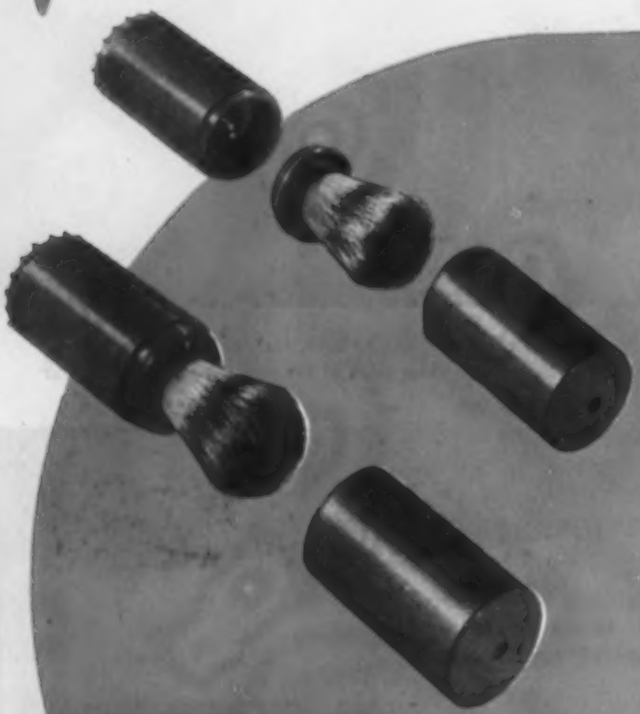
Ten-gallon polyethylene container for the transport and storage of corrosive liquids

Various sized buckets with welded-in bottoms are also being employed in the chemical industry

Plastics Products



Brides often find a desired recipe which is for more than two persons, but have trouble taking—for example—1/3 of 1 1/4 cups to reduce the recipe. With Recipe-Ralph, made of Vinylite in a form similar to a circular slide rule, splitting or multiplying a recipe is simple. Cellulose Products Co., South Gate, Calif., prints, laminates, die cuts, and assembles it for Recipe-Ralph, 470 Nevada Ave., Palo Alto, Calif.

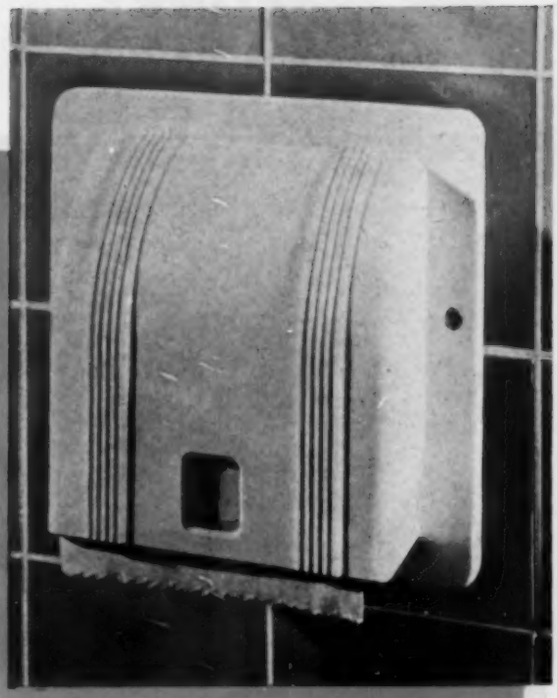


Turn the bottom disk of this fountain-type shaving brush and a plunger forces cream through the wet brush. It merely requires rinsing after use. To reload, brush is unscrewed, feed disk turned to bring plunger to bottom, and cream inserted. Korris Products, Cicero, Ill., molds case of Tenite II cellulose acetate butyrate for Miracle Fountain Shaving Brush Co., 2424 N. Sacramento Ave., Chicago, Ill.

Indirect light from the top, a "spot light" for shaving or applying make-up, and a plug-in outlet are provided in the Lens-Ray, a new bathroom lighting fixture marketed by the Mitchell Mfg. Co., 2525 Clybourn Ave., Chicago, Ill. The shade and holder are molded of Plaskon urea formaldehyde. A 3-in. convex glass lens set at an angle in the louver bottom throws light on the face before the mirror

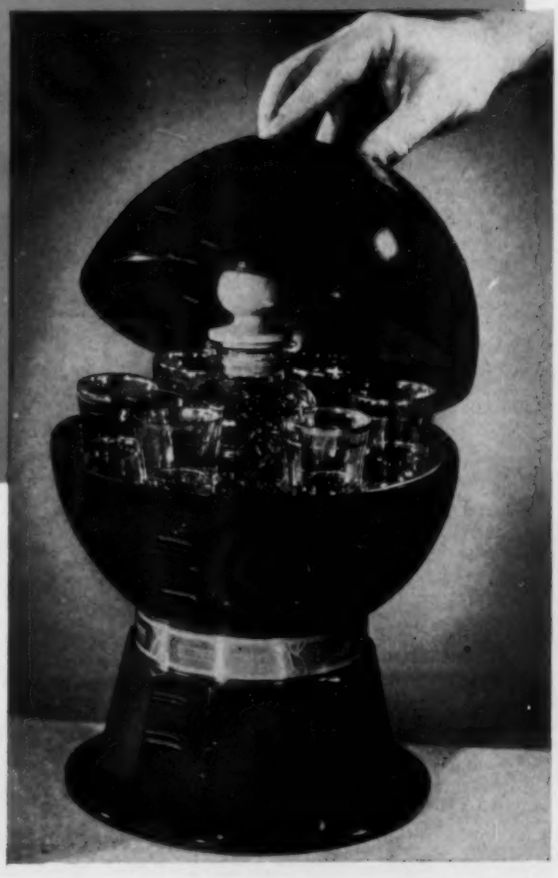
Jewelry, cigarettes, powder, or bon-bons may be kept in this box which plays a tune when the lid is removed. Beetle urea formaldehyde was selected for the housing because of its strength, smooth surface, and color range. Put out by the George S. Scott Mfg. Co., of Wallingford, Conn., the box incorporates a Swiss music mechanism and comes in solid colors or ivory combined with blue, pink, or green

Release of a spring sends this Jet Racer catapulting down a hall speedway to delight its youthful "driver". The toy car has a molded cellulose acetate body and wheels, a metal spring and spring release, and a cellulose acetate tubular spring housing extruded by Streamline Plastics Co., 175 Prince St., New York, N. Y. Elmar Products Co., 1133 Bdwy., New York, N. Y., markets the car in a variety of colors



Toilet rolls are hidden from view with the Hyd-A-Roll toilet tissue dispenser molded of white Tenite cellulose acetate to match the white porcelain of other bathroom fixtures. It requires a wall recess 5¼ by 5½ inches. Designed by Ulberg Mfg. Co., Portland, Ore., the dispenser is distributed by Cathco Sales Co., 5914 N.E. 42nd St., Portland 13, Ore. Molded by Grant and Roth Plastics, Inc., Portland, Ore.

At home in a den or on a desk top, this bowling ball bar contains a decanter, six gold-trimmed glasses, and a music box. Mottled brown Durez phenolic was selected for the base and two sections of the imitation ball because its finish closely resembles that of a real bowling ball. Molding by Breyer Molding Co., 2536 W. Lake St., Chicago, Ill., for Evans Novelty Co., 216 N. Clinton St., Chicago, Ill.



At a touch of the finger, cigarettes pop up one at a time from this ejector cigarette case which is molded of Lucite acrylic in various colors and manufactured by the Dandy Plastics Products Corp., 250 Fifth Ave., New York, N. Y. The flat, light weight case fits easily into a man's pocket or woman's handbag. The acrylic lends itself to a variety of designs with molded-in patterns or silver-plated motifs

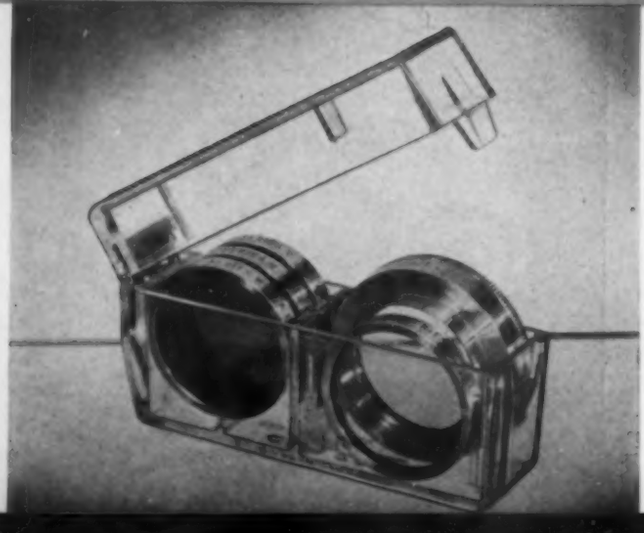
Plastics Products

From two to seven 1/4-in. holes can be punched in as many as 10 sheets of 16-lb. bond paper at once with Punch-All, an adjustable hand punch. A red or black Tenite II cellulose acetate butyrate base, molded by R.E.C. Mfg. Corp., Holliston, Mass., reduces danger of marred surfaces. Molded-in calibrations serve as guides. Manufactured by Punch-All Co., Inc., 46 Hinckley Rd., Waban 68, Mass.

Handy is the word for the palm-sized, two-edged sharpener which will keep blades of figure or tubular skates keen at all times. Slots on opposite sides of the square contain bars of Carboloy for sharpening the two types of skates. Plastomatic Co., Fitchburg., Mass., molds the Alladin sharpener of Tenite II cellulose acetate butyrate for New England Carbide Tool Co., Inc., 60 Brookline St., Cambridge 39, Mass.

Dust and dirt from shoes can be washed from this gay Scotch plaid shoe bag with a damp cloth or by immersion in suds. Stainproof, streakproof, and abuseproof, the bag is made of Lumite woven plastic fabric and manufactured by North American Photo Devices, Inc., 140 Worth St., New York, N. Y. The bag is available in a number of colors and conveniently holds six pairs of men's or women's shoes

Camera filters can be kept readily accessible but protected from dust and scratches in Filter-Safe, a handy transparent polystyrene filter carrying case manufactured by Tiffen Mfg. Corp., 71 Beekman St., New York 7, N. Y. The case has compartments for five filters and an adapter ring and comes in two sizes — for Series V and Series VI filters. Special springs hold filters in place for storage



For table or mantel decorations for Christmas, Miller Electric Co., Pawtucket, R. I., has introduced a roly poly red Santa on shiny green skis and a dapper white snowman in top hat illuminated from within by small incandescent type Christmas tree bulbs. Both figures are molded of polystyrene and may be used after the holidays as night lights in a nursery. Santa is 4½ in. high, the snow man 6 in. high

Appealing point-of-sales display unit for Miller Brewing Co.'s High Life beer consists of formed acrylic sheeting for the bucket and a formed cellulose acetate half-bottle. The half bucket, which is finished on the reverse side to simulate metal, is produced by Central Stamp & Seal Inc., 941 N. Third St., Milwaukee, Wis. L. A. Goodman Mfg. Co., 131 W. 63rd St., Chicago, Ill., makes the bottle replica

A low cost desk set with the feel, appearance, and weight of onyx has been produced through the use of a polystyrene base molded in natural or carnelian with an onyx finish and weighted with plaster of Paris. Polystyrene is also used in the pen socket and pen. Manufactured by Imperial Pen & Pencil Co., Inc., 200 Fifth Ave., New York, N. Y., the set includes a ball point pen. The metal swivel has a gold finish

Comfort plus—that's the new Mitchell Lullaby bed-lamp radio which provides music and a reading lamp in one unit. The walnut finish or sprayed ivory phenolic cabinets are molded by International Plastics Co., 4387 W. 35th St., Cleveland, Ohio. The lamp-radio unit is produced by Sonora Radio & Television Corp., 77 W. Washington St., Chicago, Ill., for Mitchell Mfg. Co., 2525 Clybourn Ave., Chicago

Plastics Products

Pumps for Mother, conservative colored oxfords for Father, gay hued oxfords for Brother or Sis — all in miniature and housed in transparent display boxes, along with gift certificates — are being used by shoe retailers to promote the idea of "shoes for gifts". Success of miniatures in the men's hat industry led to their use in the shoe field. The Campro Co., Cambridge, Ohio, molds the container and three types of shoes of polystyrene

Two notes for the front door, one for the rear door feature the Snapkit Golden Tone Electric Door Chime marketed by Marks Products Co., Inc., 90 N. Ninth St., Brooklyn, N. Y. A 16-volt transformer is recommended for best results. The housing, designed to meet the modern trend, is molded of Beetle urea formaldehyde by Cable Electric Products, Inc., 90 N. Ninth St., Brooklyn, N. Y.

Youngsters will remember parents' admonitions with this see-where-you-are-going umbrella of clear Vinylite plastic, for safety mottoes and policemen, printed in bright reds and greens, are scattered over it. The Celluloid handle, made and decorated by D. Miller & Co., Lancaster, Pa., resembles a traffic light. Marketed by Eichenbaum Umbrella Co., 298 Fifth Ave., New York

Modeling from the Celluloid dresser set so close to the heart of the daughter in "I Remember Mama," the Prolon Plastics Div., Pro-phy-lac-tic Brush Co., 221 Pine St., Florence, Mass., has introduced molded Lumarith cellulose acetate dresser sets in four patterns. The sharp definition of the old hand-carved nitrate sets is retained but added durability has been attained in the switch of plastics materials

A cheery note is added to a breakfast nook with this teapot salt and pepper set which can be hung on the wall or set on the table. Shakers, about 3 in. high, hold ample supplies of salt and pepper. Superior Plastics Div., Commonwealth Plastics, Inc., 426 N. Oakley Blvd., Chicago, Ill., molds and markets the polystyrene sets in red, blue, green, and yellow. Designed by Charles E. Jones & Associates, Inc., 189 W. Madison St., Chicago

On rainy days, mud-spattered stockings are a frequent source of annoyance to women, but one which can be avoided if a pair of Glamour Spats are carried in the handbag. Both the spats and a compact zippered case are fabricated of transparent Vinylite plastic film by Clarvan Corp., 700 W. Michigan, Milwaukee, Wis., for Wheaton Weather Wear Inc., 600 Woodward Ave., Detroit 26, Mich. Can be worn with any shoe

Wearing qualities and the ability to lie flat without curling led to the use of rigid Vinylite plastic sheets for these decorative place mats. Hand painted designs in a wide range of colors allow them to harmonize with all types of tableware. Edges of the mats are also hand cut to add interest. Manufactured by E. Longyear of Piermont, N. Y. They are easily cleaned by washing in lukewarm suds or by wiping with a damp cloth

Bobby-soxers go for the bright colors, others for the smooth durable surfaces of these Styron polystyrene loose-leaf notebooks manufactured by the Feldco Loose Leaf Corp., 1505 W. Leland Ave., Chicago, Ill. Molded by F & F Mold & Die Works, 103 Sachs St., Dayton 3, Ohio, with temperature control to prevent warpage and distortion, the notebooks require 1 lb. of plastic each for covers and ⅛ lb. for backs. They take paper 6 by 9½ inches

delivery?

AT MIDLAND IT'S FASTER THAN A CAT CAN HAVE KITTENS!

This wall socket hobbed cavity by Midland incorporates two narrow "T" projections raised 3/16 inches above the cavity surface. By using hobbed cavities of this type in place of the conventional insert cavities, all unsightly parting lines were eliminated and in addition to improving appearance, the hobbing was accomplished at only a fraction of the cost of cavity duplication by machining methods.

Yes, actually! It takes a cat nine weeks—and on most hobbed cavity jobs we do a *lot* better than that! Our skilled craftsmen, our machining, engraving and hobbing equipment are working constantly, accurately on a schedule that means delivery of hobbed cavities in a matter of weeks —not months. Whenever you order from Midland you are assured the kind of accurate, uniform, perfectly finished hobbed cavities that only skill and experience can provide.

So if limited molding capacity and long quoted delivery are holding you back, grab the problem by its neck and bring it to Midland where delivery is shaved to a cat's whisker.

For a clear picture of our equipment and our know-how, write for a copy of "Shaping Tomorrow Today." Better still, send your blueprints!

MIDLAND DIE AND ENGRAVING COMPANY
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D&E

Molding Polyester-Glass Fiber Laminate

Development of satisfactory techniques has resulted in adoption of the material for use in rugged ends for railway coach seats

by ROGER B. WHITE†

A POLYESTER-GLASS fiber laminate has been adopted by the Coach and Car Equipment Corp., Chicago, Ill., one of the country's leading manufacturers of railway seating equipment, for arm ends on their de luxe line of seats designed for ultra-modern railroad coaches. These arm ends, molded of "Glastic" laminate by Laminate Plastics, Inc., Cleveland, Ohio, are already in use on seats installed in coaches now in service on the Monon, Southern, and G. M. & O. lines; other installations are scheduled for coaches ordered by the Southern Pacific and other U. S. and foreign railroads.

A distinctive, yet never repeating, pattern effect is created in this laminated material by non-uniform clouds of matted glass fiber as they appear at the

*Reg. U. S. Patent Office.
†President, Laminated Plastics, Inc.

Two views of a polyester-glass fiber laminate arm end section which is now being employed on deluxe railway coach seats. Its shape and hollow construction required a special mold

Coach seats with arm end sections in place. These plastic sections do not show scratches, require no polishing, can be washed with ordinary soaps, and—as color is an integral part of the pieces—need no retouching

Glass fiber mats are pre-cut to desired shape and size with the help of accurate templates and a cutting machine similar to those employed in the garment industry

Seven layers of glass fiber mats are used to produce one arm end section. To impregnate lay-up, an operator simply spreads pigmented resin evenly over entire area of pre-cut mat

surface of the molded parts, an effect which is comparable to the patterns found in marble or mother of pearl. When rendered in color to match or contrast with other decorations in the car, this pattern creates a warm, comfortable atmosphere.

In addition to their attractive appearance, seat ends molded of this laminate are exceptionally tough and resistant to the abuse so generally accorded to railway equipment. The surface is not easily scarred and scratched, but when such damage is inflicted the heterogeneous pattern of the surface conceals the marks so well that they can be detected only upon close scrutiny. The molded parts are easy to maintain since they can be washed with ordinary soaps, require no polishing, and the color is a permanent part of the material itself, needing no retouching or other maintenance attention.

From the engineering standpoint, the successful production of these arm ends represents a noteworthy achievement. Since each of these large parts had to be made in a single piece, its hollowed-out construction made the choice of molding technique rather difficult. Because neither the shape of this piece nor the character of the materials lend themselves to conventional molding, a special mold design was required.

From the beginning, it was obvious that the impregnated glass mat could not be placed correctly inside a long, narrow, deep mold such as would be required for this part by conventional techniques since unattractive wrinkles and folds would result from any attempt to make these pieces with matched metal molds. A way had to be found to expand the glass mat lay-up against the outer mold surfaces to avoid such wrinkles and at the same time to exert sufficient pressure to produce the desired surface finish.

The final set-up consisted of a female mold in two halves, a cast aluminum centered core or "force" which was purposely made considerably undersize,

Under size cast aluminum centered core has been placed in a rubber bag which will later be expanded by air pressure applied through hose to supply the force necessary for molding

As a protection against the solvent action of the uncured plastic, the rubber bag is covered with cellophane. It is not necessary for the finish on the inside of part to be perfect

and a rubber bag which was designed so as to encase the cast aluminum core. The necessary expanding action is then obtained by expanding this rubber bag with air pressure.

The molding operation is carried out with seven layers of Fiberglas mat. Each layer is cut to a carefully worked out shape which gives sufficient overlapping in the piece itself to insure adequate structural strength; at the same time, conspicuous joints must be avoided in the molded piece, as must also excessive thickness in the over-lap areas. These layers are precut in stacks, using accurate templates and a standard cutting machine similar to those used in the garment industry.

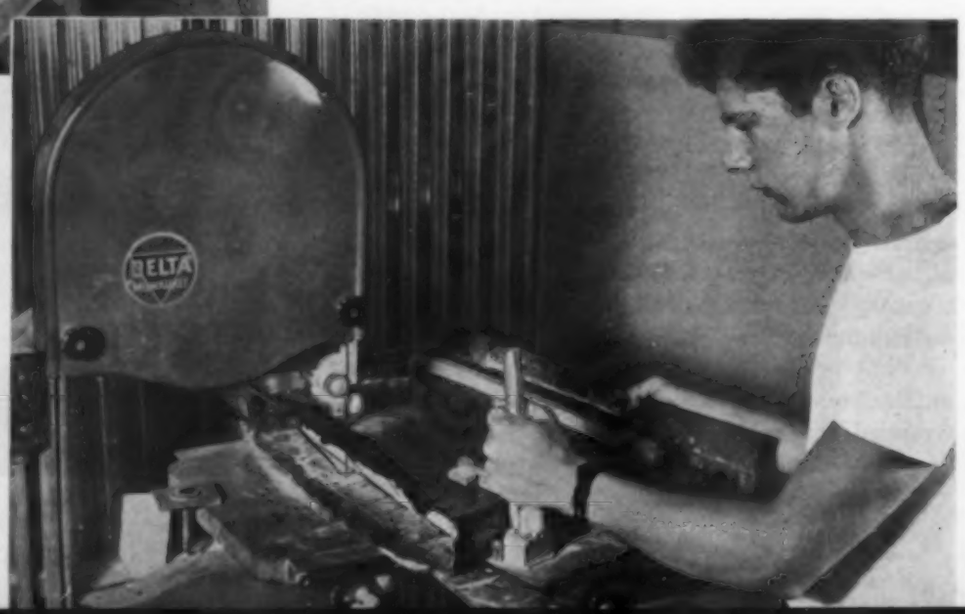
Impregnating

The impregnating technique employed is very simple yet effective. A measured quantity of Paraplex P-43 resin, previously catalyzed and pigmented, is poured out on the mat lay-up. It is then quickly distributed over the entire area by a skilled operator who has learned to obtain just the right degree of uniformity. The rubber covered aluminum core is wrapped with cellophane to protect the rubber from the solvent action of the uncured plastic and the

Mold assembly is closed over core which has been wrapped with impregnated glass fiber mat. The resin has been applied on the inside of the lay-up and has not yet been forced through

Assembled mold in press. After press is closed, air is admitted between the rubber bag and core, expanding the bag and pressing the lay-up against the female mold surfaces

Finished section is removed from mold. Before mold was taken from press, the rubber bag was sucked against aluminum core with vacuum and both were withdrawn



The only finishing necessary is sawing of flash from the edges of the molded section. It is then ready for assembly into the coach seat

layers of impregnated glass mat are then wrapped around the cellophane-covered core and the entire assembly is placed in the lower half of the female mold. The operator then places the upper half on top. The entire mold and lay-up are then placed in an hydraulic press and clamped. Air pressure is then admitted between the rubber bag and the core, thereby expanding the bag and pressing the impregnated mat lay-up firmly against the female mold surfaces. Curing is conducted at 275° F.

Parting agents used

Because the finish of the inside of this molded part need not be perfect, it is satisfactory to use cellophane as a parting agent around the core. However, it was found necessary to use a light coating of Vejin parting agent on the chrome plated female mold surfaces.

The techniques employed in the manufacture of these parts molded from polyester thermosetting resins and Fiberglas mat filler materials were developed progressively through a long program of experimental work in which many ideas were tried and discarded. The method as now employed still involves a certain crudeness in some aspects, due to the relatively short term of experience so far available, but sufficient perfection in manufacturing techniques has been attained to place the job on a regular production schedule involving several thousand pieces. The coach seat parts involved have been adopted as standard equipment by the manufacturer, and an adequate production record has been set to satisfy everyone concerned that the operation is based on sound economics.

Those who have been associated with the activities in the polyester-Fiberglas field of development over the past few years will recognize that this represents a substantial achievement. Laminated Plastics, Inc. feels this work will serve as a foundation for further progress in the field and will enable many projects, once considered impracticable in a competitive market, to be undertaken.

How Automatic Is Automatic?

by A. A. HUTCHINGS*

PRELIMINARY MOLDING COST STUDY
(CONFIDENTIAL)

For [redacted] Date: [redacted]

Address [redacted]

PRODUCTION DATA

Item No.	Description	Type Press	Annual Requirements	Cycle (In Minutes)	No. Cavities	Production 24 Hr. Day	Weight (Grams)	Pounds/Yr.	Machine Days
1	PART "A"	200D-3	100,000	1¼	1	1050	32	7,000	96
2	PART "B"	200D-3	100,000	2	2	1500	16	3,500	78
3	PART "C"	200D-3	100,000	1¼	3	3150	11	2,400	32
4	PART "D"	200D-3	100,000	1½	3	2650	3	655	38
5									
6									
	TOTALS		400,000					13,555	244

COST DATA

Item No.	Type Material	Est. Material Cost/Lb.	Material Cost Per 1000	Heat and Power Cost Per 1000	Labor Cost: Finishing	Labor Cost: Press Per 1000	Mfg. Cost Less Overhead	Overhead, Etc.	Total Manufacturing Cost
1	UREA	32¢	24.90	.57		2.28	27.65		
2	"	"	12.40	.49		1.96	14.85		
3	"	"	8.52	.19		.76	9.47		
4	"	"	2.32	.22		.88	3.42		
5									
6									
	TOTALS		48.04	1.47		5.88	55.39		

COST SUMMARY (See also comments on reverse):

Material Cost (Col. 13) 1000 SETS 48.04
Heat and Power Cost (Col. 14) 1000 SETS 1.47
Labor Cost (Cols. 15 and 16) 1000 SETS LESS FINISHING 5.88

Manufacturing Cost, Less Overhead (Col. 17) .....

Purchase Price of Finished Parts .....
Manufacturing Cost, Less Overhead (Col. 17) .....

GROSS ANNUAL SAVINGS .....
Production Overhead, Depreciation, etc. (Col. 18) .....

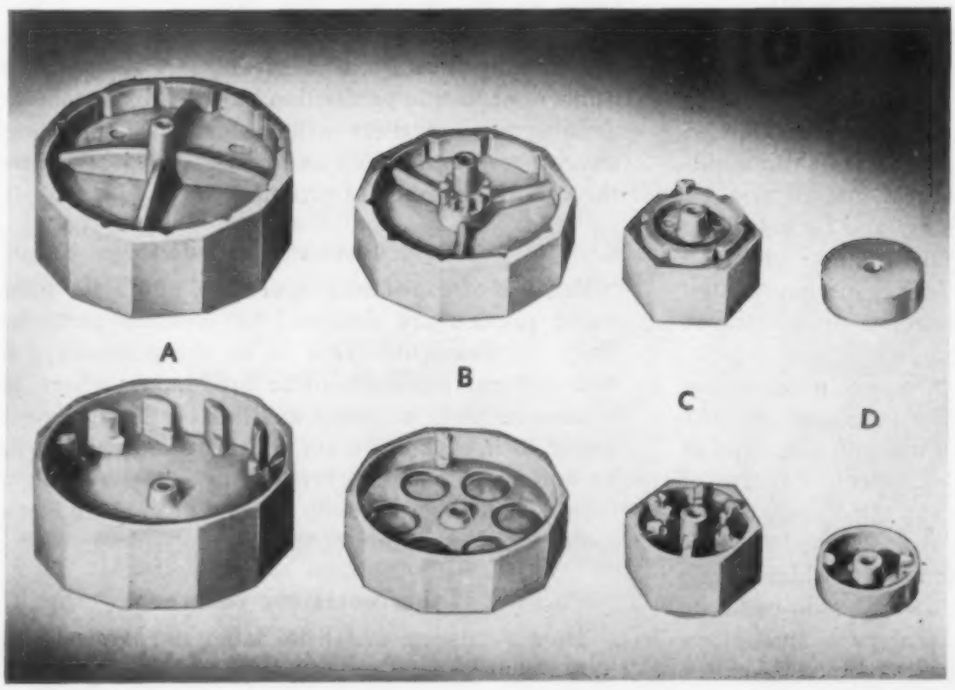
NET ANNUAL SAVINGS .....

THE eagerness to exploit improvements in machinery and equipment has led to such a widespread misuse of the word "automatic" that its application to plastics molding presses appears to be in need of clarification. According to the definition in the *Modern Plastics Encyclopedia* (1948, page 1247), fully automatic molding presses require no more labor than keeping the hopper filled with molding compound and carrying away the finished parts as the receiver becomes filled.

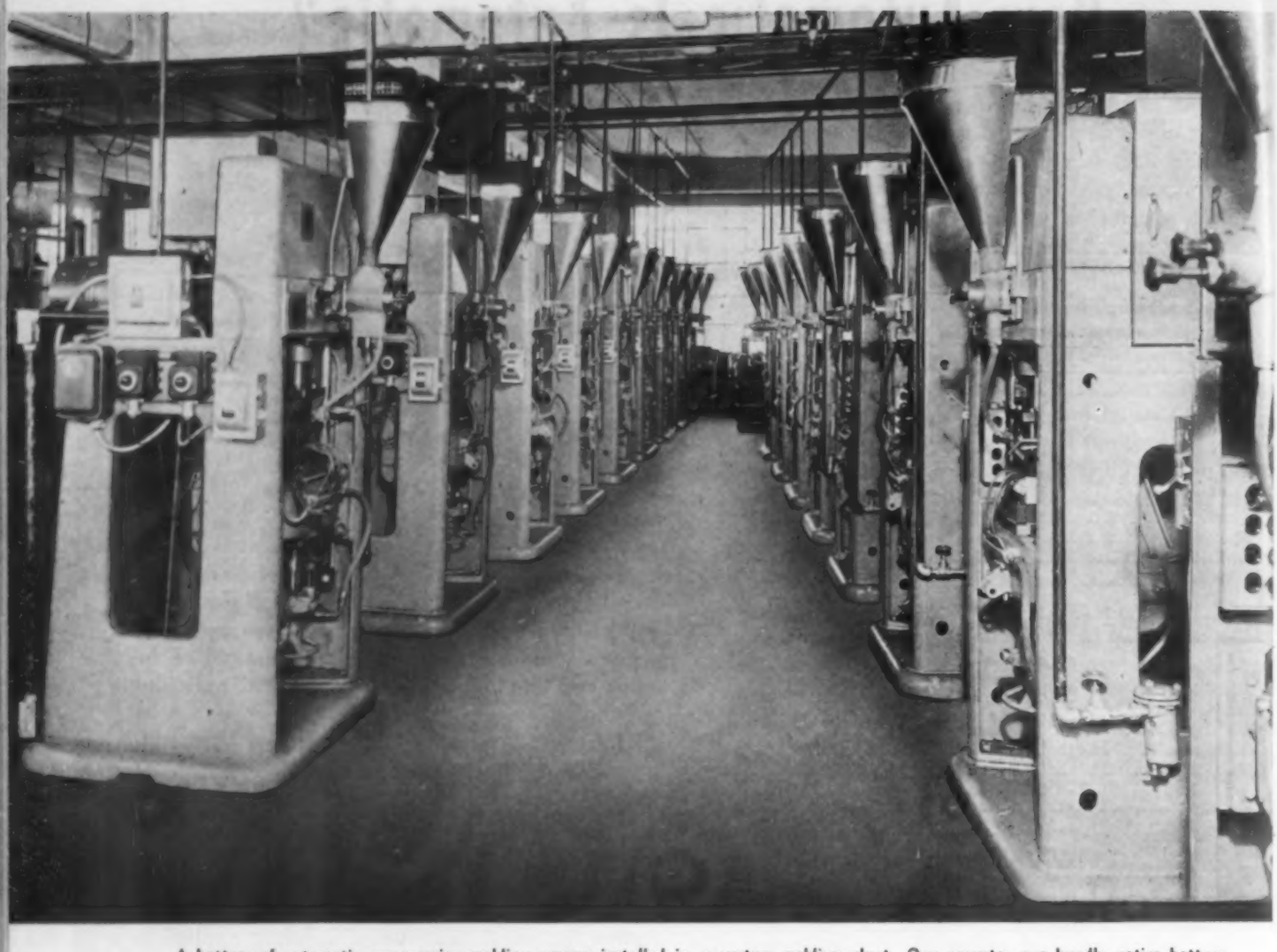
Inasmuch as the hopper of a modern truly automatic press holds an 8-hr. supply of powder, and may be arranged to hold even more if desirable, it will be seen that a single attendant can serve many presses. As many as 24 of the one type of fully automatic molding presses are serviced by a single operator.

The term "automatic" as applied to a complete press should therefore have a highly restricted meaning for the plastics industry, whereas in practice it has come to mean many things. Automatic cycling, as a single example, takes only the element of time out of the operator's control, so that molding and curing are not subject to human fallibility. Again, the word "automatic" is often applied to a series of operations mechanically performed but set

*Manager, Plastics Molding Div., F. J. Stokes Machine Co.



Left: Top and bottom view of four electric clock components molded of urea formaldehyde on completely automatic compression molding presses. The preliminary molding cost study sheet at top left gives a breakdown of costs



A battery of automatic compression molding presses installed in a custom molding plant. One operator can handle entire battery

in motion by manual push-button control. Obviously, none of these operations individually, nor the sum of them, is fully automatic plastics molding. The term "automatic" can accurately be applied only when the machine takes over completely, after it is set and the hopper filled, and delivers finished parts to a receiver. Further, fully automatic molding presses provide for mechanical interruption by stopping the machine immediately and by actuating a warning bell and a warning light, either of which signals the operator in case failure of any switch in the cycle interrupts the sequence of operations, or if there is failure to eject properly.

Fully automatic molding offers a great many advantages when the part to be produced and the desired production adapt themselves to this type of operation. Making a decision between the use of fully automatic and semi-automatic molding requires the comparison of several different factors, all of which are of an economic nature. Chief among these factors are: total production, required rate of production, size and weight of part, and allowable cost, as well as a comparison of mold costs, labor costs, and press investments. Future uses of press to be selected, and possible part design changes are also of importance.

Assuming, now, that a given part falls in the range of economic production by the fully automatic molding process, there will be found a great many advantages, both direct and corollary, to be gained through this method of production.

Mold costs are reduced

Because of continuous operation, molds for automatic presses are designed to produce parts for daily requirements. This is in sharp contrast to conventional semi-automatic production where an expensive mold of many cavities is used intermittently to keep labor costs within reasonable limits. In automatic molding, few cavities do the work of many, since labor costs do not dictate the size of the mold or the operation of the press.

Labor costs are reduced

Thus it is seen that little labor is required with automatic presses and it can be utterly unskilled

labor. To be sure, an experienced set-up man is required to set up the presses and adjust the time cycle and the feed, but the one manufacturer of fully automatic molding presses supplies this service initially direct from the factory and coaches the foreman on how to vary the set-up for other parts. After this, no unusual skill or even close supervision is required. It is only necessary that the hopper be filled with molding compound and the ejected parts removed from the receivers. Ordinarily a single operator handles 10 or 12 machines though in some cases as many as 24 are handled. In some cases night watchmen handle this service as part of their regular rounds. The machines are fully protected against the consequence of any possible failure by automatic controls which halt operation instantly and call attention to the need for any trifling correction or adjustment. Again, it must be emphasized that any adjustment of this sort is fully within the ability of the unskilled operator.

Another labor factor which is eliminated by the use of automatic presses is the small but cumulative loss from the actions of corner-cutting piece-operators. Further, machine hazards to personnel are eliminated. There is no hypnotism of routine to make an operator become careless in clearing finished parts from the mold. Finally, precise feed (accurate to ½ gram), precise molding, precise curing, all automatically controlled, assure the production of perfect and identical parts so that inspection and finishing of the units are virtually eliminated.

Material costs reduced

Precise unfailing automatic control is again the agency in assuring material economy. The original setting and adjustment of the press provides the exact amount of compound required for the finished product and the minimum amount of flash. Excess flash, though it may be but a trifling excess, represents a serious item in long runs. Again, automatic control of all functions assures identical products and therefore eliminates waste in the form of rejects.

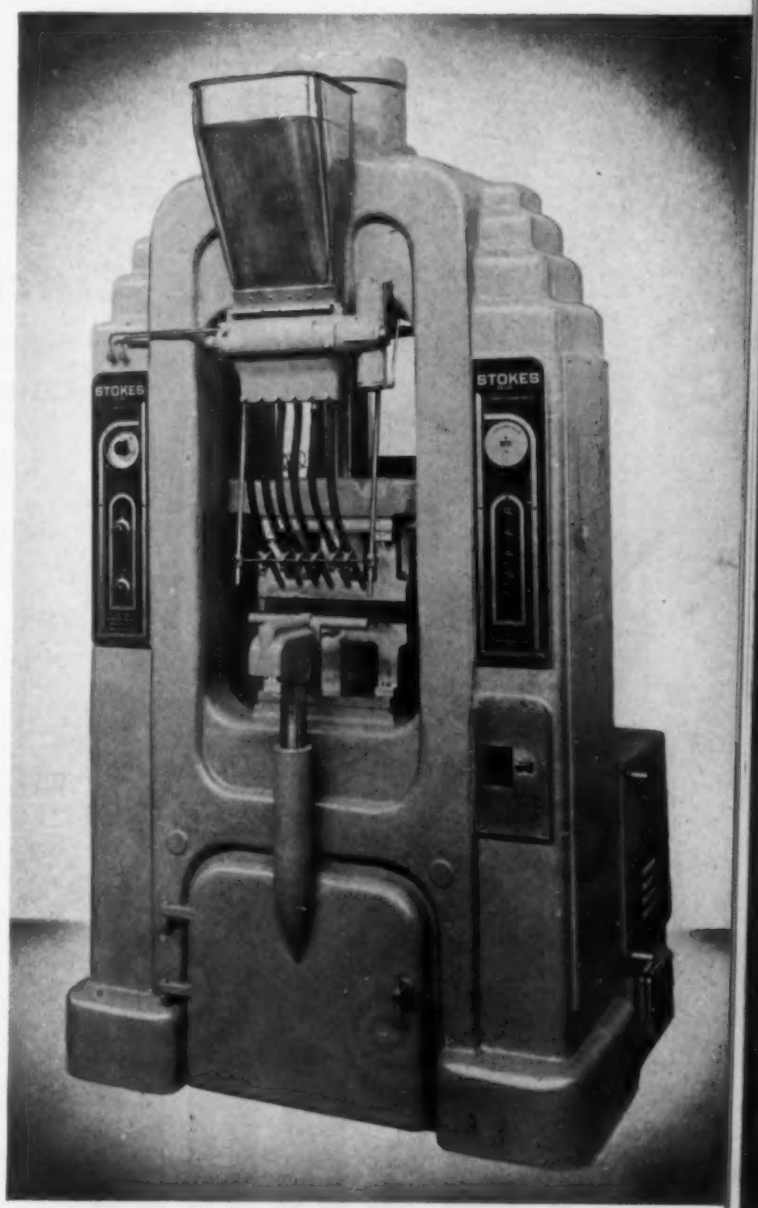
Finally, automatic molding of parts can be paced to assembly requirements or customer demands. Inventory can be maintained at economic levels and storage losses avoided.

The product is better

The product of truly automatic molding presses is fully controlled before production begins. The die-maker makes and perfects the mold. The set-up man from the factory sets and adjusts feed, time cycle, loading, and ejection. A few hours' supervised operation serves to season the mold. From then on, automatic presses can make only perfect identical parts.

In conclusion it is seen that there is a determinable range of product design and production requirements within which fully automatic molding of thermosetting plastics is most economical. Within this range fully automatic molding produces parts of highest quality under identical conditions of time, heat, and pressure. The flexibility of the presses permits production to be geared to requirements so that heavy inventories need not be carried. Labor cost is insignificant. Flash waste is extremely low. Mold investment is low, and the molds are quickly put into production. The fully automatic molding press, if put to the uses for which it is most properly fitted, will frequently pay for itself in less than a year.

The only attention this 50-ton automatic compression molding press requires during operation is filling of the hopper with molding powder and removal of the finished parts. Among the advantages of such a press are its flexibility in use and low labor cost, flash waste, and mold investment



Why

A PLASKON MOLDING COMPOUND IS USED FOR THIS LARGE CLOCK HOUSING

lightweight . . .

strength . . .

beauty . . .

are Plaskon Molded Color features in this Cincinnati Advertising Clock

The Cincinnati Advertising Clock is a product of the Cincinnati Advertising Products Co., Cincinnati, Ohio. The Plaskon Molded Color housing is molded by Chicago Molded Products Corp., Chicago, Ill.

LIGHTWEIGHT . . . this big, handsome housing is 18 inches in diameter and 3¾ inches in depth, yet is extremely light in weight. This important Plaskon Molding Compound feature reduces costs through every step from raw material handling to delivery of assembled clock at destination.

STRENGTH . . . The Cincinnati Advertising Clock again exemplifies the high strength-weight ratio of molded Plaskon, which compares favorably with many metals. Its high impact strength permits it to absorb shocks and vibrations without material effect.

BEAUTY . . . The Cincinnati Advertising Clock housing is clear, brilliant color through and through. Lustrous, smooth surface . . . non-corrodible . . . easy to clean.

Ask our experienced field men to help you develop products molded from Plaskon* urea- and melamine-formaldehyde compounds, for greater efficiency in your manufacturing and merchandising programs.

*Reg. U. S. Pat. Off.

PLASKON

TRADE MARK REGISTERED

MOLDED COLOR

PLASKON DIVISION

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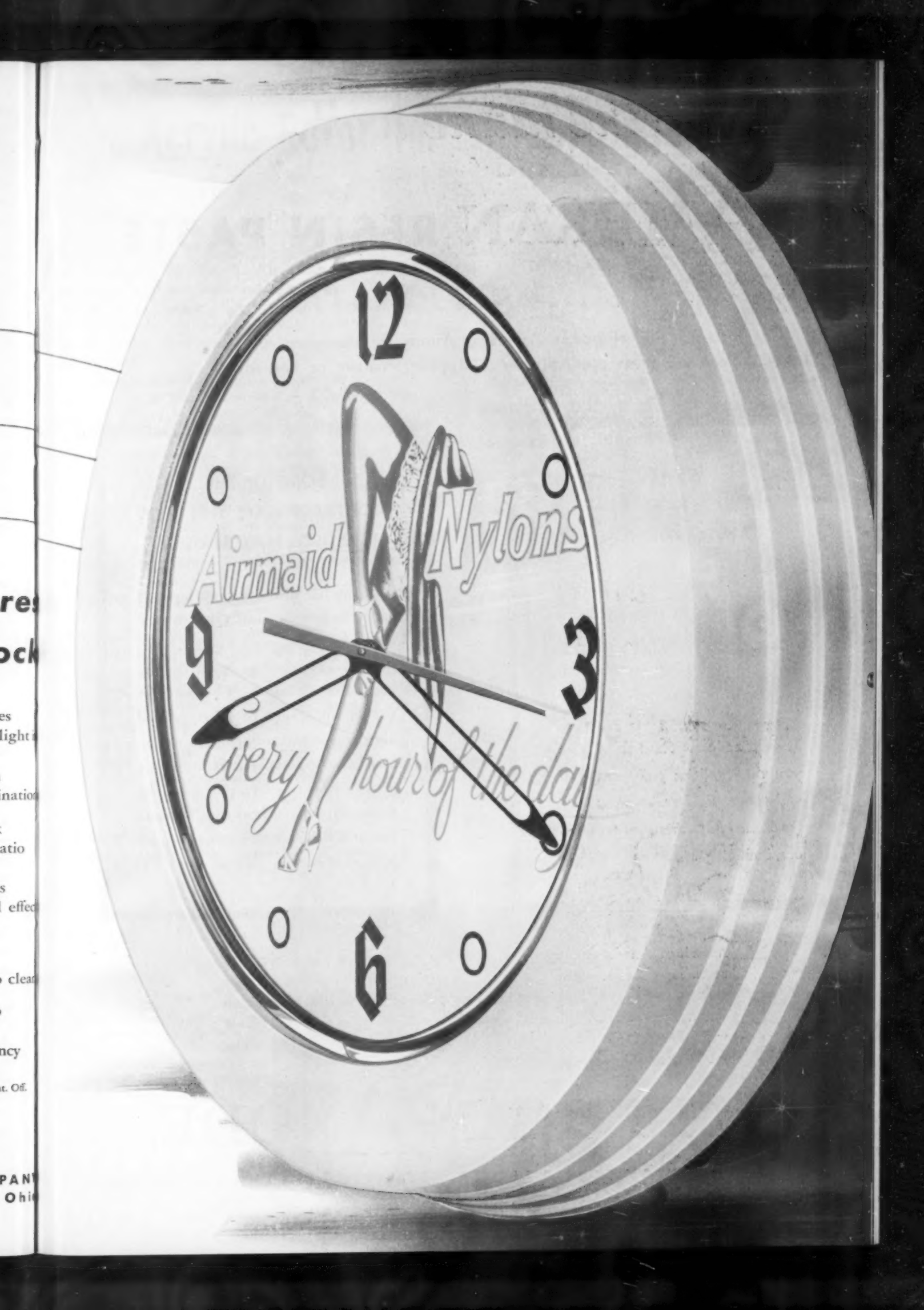
In Canada: Canadian Industries Ltd., Montreal, Quebec


12
3
6
9
Airmaid Nylons
every hour of the da

Note the name well...

AMERAN RESIN PASTE

...a new PLASTISOL

developed by American Anode for improved continuous application . . . dipping, coating or spreading

WHAT AMERAN RESIN PASTE CAN DO FOR YOU:

This new plastisol may be the long sought answer to your problems. It can be used to make coatings or flexible sheets — maintaining permanent lustre. No solvents; no fire hazard; no recovery problem. It can be compounded to give you the qualities you want — oil resistance, acid-resistance, chip proofness, full variety of fast colors, including white.

SOME OF THE PROFITABLE WAYS THIS NEW PLASTISOL MAY BE USED:

Ameran Resin Paste may be used easily and economically for coating metal and wire, wire baskets, plating racks, pipe linings, wood, textiles and paper. It can also be used for the manufacture of unsupported films and to make dipped gloves and other film applications. It has ready possibilities in casting or molding finished items, such as toys, gaskets and industrial boots. These uses may suggest even more to you.

American Anode engineers will gladly work with you in laboratory tests. They'll welcome an opportunity to study your present problems or products—help you find profitable uses and improvements with Ameran Resin Paste. For complete information about this new plastisol, please write Dept. AF-6, American Anode, 60 Cherry Street, Akron, Ohio.

AMERICAN ANODE

CRUDE AND AMERICAN RUBBER LATICES, WATER CEMENTS AND SUSPENSIONS

Acrylic Rotor for Ultracentrifuge

ELEMENTARY science students know that a body moving in a circle has a tendency to move away from the center of the circle. In chemical laboratories, this centrifugal force is harnessed to observe and measure sedimentation of particles in a liquid, to determine molecular weight, determine crystal density, or separate small particles. The device which does the job is known as an ultracentrifuge.

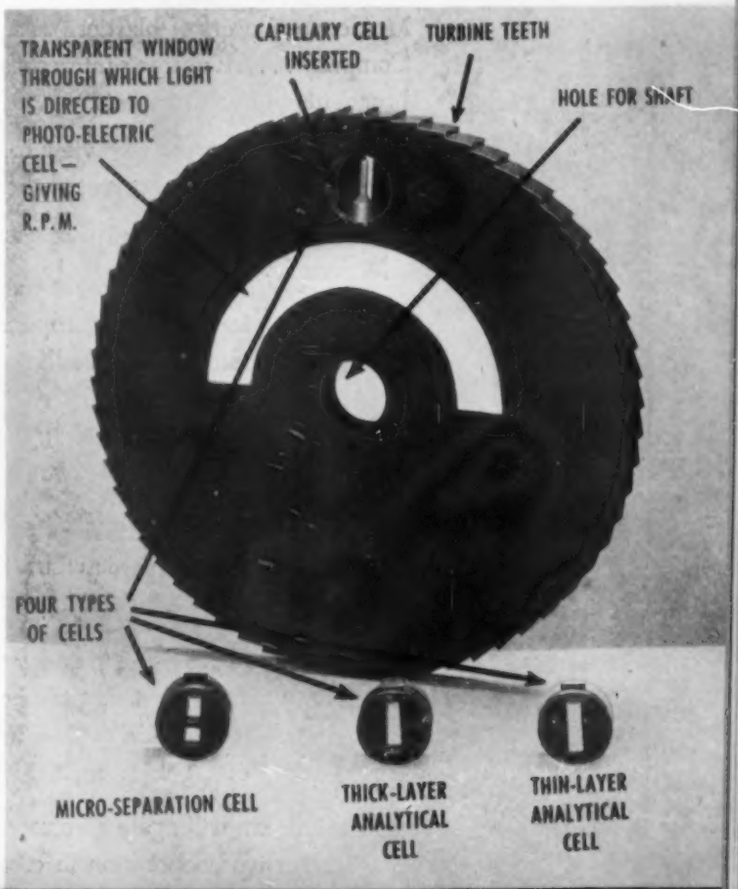
In the new Fisher-Stern ultracentrifuge, manufactured by Fisher Scientific Co., Pittsburgh, Pa., the all-important rotor is fabricated of methyl methylacrylate. This rotor is spun at high speeds by a jet of compressed air which is directed against its notched edge. Each notch is carefully machined to keep the rotor in exact balance and to utilize the maximum percentage of the driving power of the compressed air. At the top speed of the rotor — 20,000 r.p.m. — liquid samples in the rotor are subjected to a centrifugal force 26,000 times as great as that of gravity.

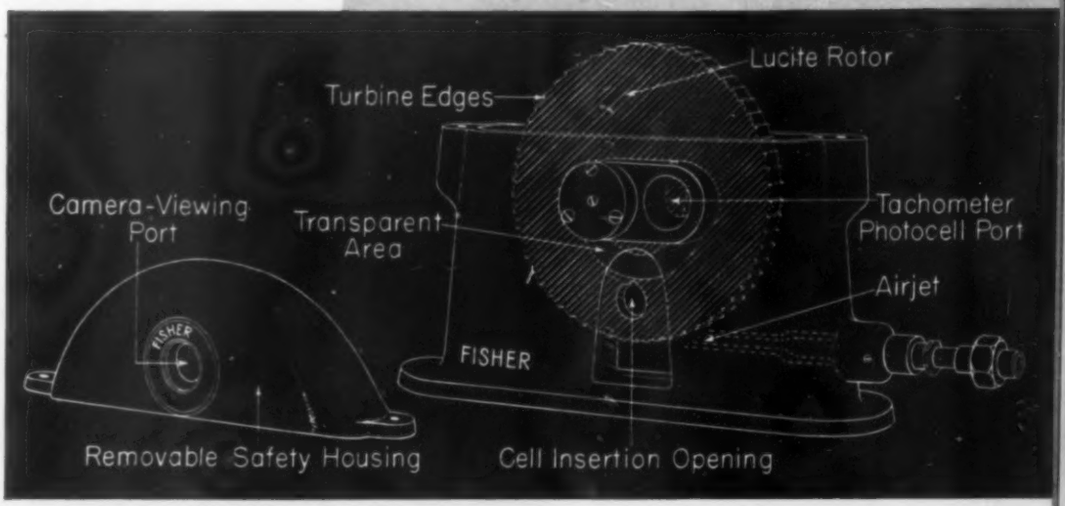
Fisher fabricates the rotor of ½-in. thick Lucite, and uses the same material for the cells which hold the liquid samples. The acrylic rotor weighs less than a pound, whereas a metal rotor the same size would weigh about 7 pounds. Thus the plastic rotor can more easily be driven at high speeds. In addition, the non-crystalline, amorphous physical structure of the acrylic rotor reduces stresses and the danger of disintegration at high speeds.

The low density (about 1.20) of acrylic is also an advantage in this application. When one of the acrylic sample cells is filled with an aqueous solution, the rotor and cell represent a nearly homogeneous system as far as density is concerned. Thus a balancing cell is not necessary. The low thermal conductivity of acrylic prevents the heat generated from affecting the temperature of the sample.

Four different types of sample cells are furnished with the ultracentrifuge. Each cell is ¾ in. in diameter and ½ in. thick. The volume of liquid they contain varies from 0.04 to 0.33 milliliters.

Fabricated acrylic rotor is shown with capillary cells. Rotor is spun by compressed air that hits notched edge





Cutaway drawing of ultracentrifuge with component parts. Design of the instrument permits studies of a wide and varied group of materials. Rotor weighs approximately 1 lb., or 6 lb. less than the same size metal rotor

Progress and profits...current and future

MAKING NEW MARKETS FOR CYANAMID PLASTICS

Molders and users of plastics . . . and we of the Plastics Department of American Cyanamid Company . . . have strong interests and objectives in common. Namely, the strengthening and broadening of your markets.

Therefore, we want to review briefly with you our advertising, sales promotional and merchandising efforts . . . current and coming.

In 1948 . . . it has been our purpose

> . . . to promote, at the consumer-retail level, the right plastics for the proper applications . . . along with the need for informative labelling. Thus, in addition to promoting our own materials, we sought to strengthen the structure of the entire plastics industry by encouraging retailers and manufacturers to exercise discrimination in the purchase and use of plastics materials.
>
> . . . to create and broaden markets for end-products made with Cyanamid thermosetting molding compounds and resins.
>
> . . . to develop and promote the market for MELMAC Tableware* via advertising in national consumer and restaurant magazines, distribution of informative leaflets and the formation of a Tableware Association.

In 1949 . . . we will again give users and molders of thermosetting materials up-to-the-minute and aggressive cooperation in creating and developing bigger and more profitable markets through advertising and sales promotion.

And *more* . . . we offer molders and fabricators of materials such as BEETLE† and MELMAC† Plastics our wholehearted cooperation in developing markets for products that may now be only in your files or your minds.

We will be happy to discuss any ideas or plans you may have, in strictest confidence —and to work with you in every possible way to make 1949 a year to be remembered.

AMERICAN *Cyanamid* COMPANY
PLASTICS DEPARTMENT
32 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

*The development and promotion of MELMAC Tableware by Cyanamid won the Merchandising award in the Seventh Modern Plastics Competition. Other applications may be developed as successfully.

†Reg. U. S. Pat. Off.

Examples of Cyanamid Plastic Department advertising, sales-promotional and merchandising during the past year. It is the aim of these campaigns to make your selling job easier; to win among manufacturers, designers, and retailers a ready acceptance of your products; and, thus, to create for you a growing market.

Cyanamid Plastics advertising, during 1948, has appeared in such publications as . . . *The Saturday Evening Post, Time, Farm Journal, Newsweek, Dept. Store Economist, Chain Store Age, Modern Packaging, Restaurant Management, Institutions, Daily News Record.*

Greater Fabric Uniformity Means Better Lamination with Mt. Vernon Extra

Greater fabric uniformity helps give you consistently more even penetration of resins—provides better lamination.

That's why Mt. Vernon Extra fabrics are a favored choice with those who specify laminating materials. . .

Mt. Vernon Extra is spun and woven under constant laboratory control to rigid standards of tolerance. Made from top grades of cotton, it achieves the high degree of uniform fabric quality that successful lamination requires.

For fabrics of uniform quality, uniform performance in your laminating processes, specify Mt. Vernon Extra.

TURNER HALSEY
COMPANY
Selling Agents
40 WORTH ST. • NEW YORK

Mt. Vernon-Woodberry Mills

Branch Offices: CHICAGO • ATLANTA • BALTIMORE • BOSTON • LOS ANGELES • AKRON

Polyisobutylene-Polyethylene Blends

by R. G. NEWBERG*, D. W. YOUNG*, and H. C. EVANS†

A comprehensive study of polyisobutylene-polyethylene blends has proven extremely interesting. It reveals that such blends may be used to formulate many useful materials such as sheeting, insulation tubing, tank linings, paper coatings, food packaging, and the like. Polyisobutylene B-120 seems to process more advantageously than either B-80 or B-260, and would probably be considered most favorably by fabricators.

SEVERAL investigators, including Sparks[1] and Lathan[2], have reported studies on polyisobutylene-polyethylene blends. These workers, however, did not give details on these blends. In recent months a great deal of interest has been generated in the use of polyisobutylene as a plasticizer for the high molecular weight solid polyethylene. Therefore, it seemed that a comprehensive laboratory investigation of such blends would prove interesting, valuable, and timely. Such a study was carried out and it is the purpose of this paper to present the most interesting features of it.

A series of tests was performed which included determination of tensile strength, modulus, elongation, stiffness, tear strength (both at room temperature and 100° C.), gas and moisture permeability, low temperature flexibility, chemical resistance, heat softening point, flex, abrasion, sunlight resistance, heat resistance, and processing. Polyethylene (Du Pont PM-1) was employed as the base resin with polyisobutylenes B-80, B-120, and B-260 as the plasticizers. Some work was also done on the use of polyisobutylene B-12 and butyl rubber (GR-I) as plasticizers.

In most of the studies a base formula was used which closely approximates some polyethylene compounds used in the industry for wire insulation and calendered sheets. The formula used was as follows:

Polyethylene + polyisobutylene	100.0
Deenax	0.25
Stearic acid	1.0
Microcrystalline wax (190° F. M.P.)	2.0

The Deenax[3] was used primarily to prevent breakdown of the polyisobutylene. Stearic acid and microcrystalline wax were used since they are commonly employed in polyethylene formulae as processing aids. Concentrations of the polyethylene in the polymer base were varied between 0 and 100 percent. In this work the several grades of polyisobutylene have been designated by B-number. B-12 corresponds to approximately 12,000 molecular weight (Staudinger) polymer; B-80 to 80,000 molecular weight; B-120 to 120,000 molecular weight; and B-260 to 260,000 molecular weight product.

Experimental procedure

The blends were prepared on a laboratory rubber mill by compounding at about 260 to 280° F. The time on the mill was 15 minutes. To form test specimens the compounds were molded in a standard

[3] A non-staining, non-toxic stabilizer sold by Enjay Company, Inc.

Table I.—High Temperature Stability[a] of Polyisobutylene-Polyethylene Blends.

Polyisobutylene in blend	*Weight loss in 7 days at 150° C.*		
	B-80	*B-120*	*B-260*
%	%	%	%
0	3.43	3.43	3.43
15	4.26	3.08	3.26
30	3.96	5.49	3.73
40	.....	6.16	5.66
45	6.90	.....	.....
50	.....	6.92	7.02
60	8.82	7.75	8.98
70	.....	8.30	10.20
75	7.52	.....	.....
85	.....	11.03	14.65
90	14.60	.....	.....
100	34.95	26.55	35.75

[a] Procedure followed with slight modification was that described by R. B. Seymour, Ind. Eng. Chem. *40*, 524 (March 1948).

* Standard Oil Development Co.
† Enjay Co., Inc.

[1] Sparks, W. J., U. S. Patent 2,339,958, January 25, 1944.
[2] Lathan, G. H., U. S. Patent 2,369,471, February 13, 1945.

Table II.—Brittle Temperature[a] (Failure) of Polyisobutylene-Polyethylene Blends.

Polyisobutylene in blend	*Brittle temperature*		
	B-80	*B-120*	*B-260*
%	°F.	°F.	°F.
0	−80	−80	−80
15	−60	−70	−70
30	−60	−60	−50
40	.....	−60	−70
45	−30	.....	.....
50	.....	−60	−50
60	−60	−70	−70
70	.....	−70	−70
75	−60	.....	.....
85	.....	−70	−70
90	−70	.....	.....
100	−70	−70	−70

[a] Tests made with Bell instrument described in A.S.T.M. D 746-44T. The specimens were allowed to condition 30 min. in air to reach equilibrium temperature in the bath prior to testing.

A.S.T.M. four-cavity mold (D 15-41) yielding slabs 6 by 6 by 0.075 inches. The slabs were molded at 300° F. for 5 min. with 900 p.s.i. pressure and then cooled under pressure.

The tests were conducted according to the A.S.T.M. and other methods cited in the tables and figures.

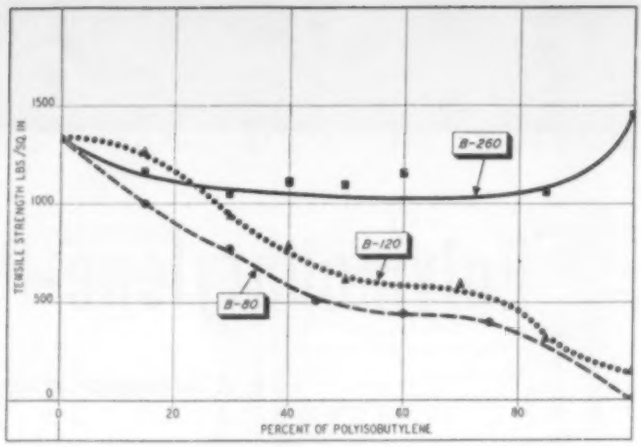
Tensile, modulus, elongation, hardness

In Figs. 1 to 4, inclusive, are portrayed the effects of blending polyisobutylene with polyethylene on tensile strength, modulus, elongation, and Shore hardness. As might be expected, B-80 and B-120 lower the tensile strength with increasing concentrations. B-260, being of high molecular weight and stronger, shows little if any deleterious effect on this property. Elongation is increased with increasing concentrations of polyisobutylene while modulus and Shore hardness are decreased. The lower

Table III.—Permeability to Gases[a] of Polyisobutylene-Polyethylene Films.

Polyisobutylene in blend	*Permeability of 10-mil-thick film at 23° C. in liters/sq.meter/24 hr.*								
	B-80			*B-120*			*B-260*		
%	H_2	CO_2	N_2	H_2	CO_2	N_2	H_2	CO_2	N_2
0	2.37	2.6	10.4	2.37	2.6	10.4	2.37	2.6	10.4
15	2.05	0.9	4.2	1.97	1.1	3.1	2.14	1.4	4.2
30	2.15	0.45	8.6	1.78	1.3	4.5	1.94	1.3	3.7
40	.....	.....	.....	2.16	1.5	4.0	1.93	0.9	4.2
45	1.87	0.44	5.4	.....	.....	.....	.....	.....	.....
50	.....	.....	.....	2.44	1.9	4.5	2.13	0.9	4.0
60	2.04	0.43	5.0	2.16	0.52	3.4	1.89	0.4	4.2
70	.....	.....	.....	2.24	0.58	3.8	2.11	[b]	5.0
75	2.06	0.45	3.9	.....	.....	.....	.....	.....	.....
85	.....	.....	.....	2.34	.58	3.7	2.09	0.4	6.3
90	1.94	0.2	5.2	.....	.....	.....	.....	.....	.....
100	1.56	[b]	7.7	2.44	[b]	4.3	2.32	[b]	4.5

[a] A.S.T.M. D 815-44T.
[b] Poor film exhibiting pin holes.



1 — Tensile strength of polyisobutylene-polyethylene blends (See note a, Table VII)

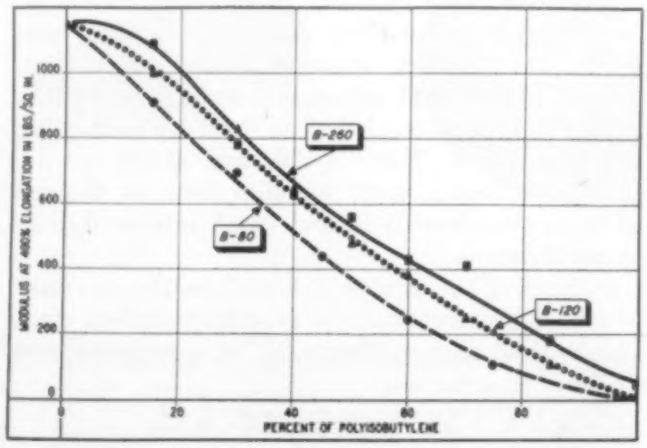
molecular weight polyisobutylenes exhibit the more pronounced effect. It is interesting to observe that up to 40 to 60% concentration of polyisobutylene good physical properties are retained by these polyisobutylene-polyethylene blends.

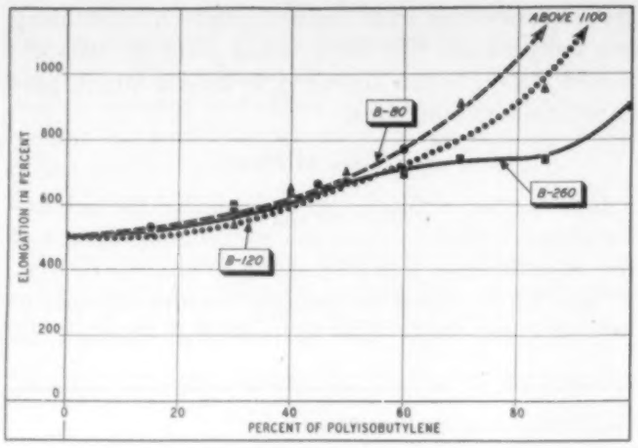
Heat softening point

Since it is particularly desirable to retain a high heat-softening point it is imperative that any modifying agent should have little or no effect on this property. Williams plasticity at 90° C. and heat softening point data are shown in Figs. 5 and 6. The heat softening point was obtained by plotting Williams plasticities versus the temperature. Typical curves resulted which showed the transition of the material from a solid or rigid state through thermoelastic and thence to a thermoplastic condition. The heat softening point was considered to be the temperature at which the plastic first exhibited thermoelastic tendencies.

B-80 again exerts the greatest plasticizing action and is detrimental even in small concentrations. B-120 and B-260, however, even in concentrations

2 — Modulus values of polyisobutylene-polyethylene blends (See note a, Table VII)





3 — Elongation values of polyisobutylene-polyethylene blends (See note a, Table VII)

up to 50% show little effect on the heat-softening property.

Tear strength

Polythene is used in sheet form extensively for clothing, containers, and the like. It is, therefore, necessary that it exhibit good tear strength. The effect of polyisobutylene on this property is shown in Figs. 7 and and 8. In all cases, as the concentration of polyisobutylene increased the tear strength decreased. However, up to 50% concentration tear strengths in excess of 200 lb. per linear in. were obtained.

As might be anticipated, at elevated temperature (100° C.) the tear strength was exceedingly low and addition of polyisobutylene aggravated this condition.

Processability

Processing tests were run on the calender and extruder. Some extruder processing data obtained at 280° F. are shown in Figs. 9 and 10. In both calender and extruder tests it was demonstrated

4 — Shore hardness of polyisobutylene-polyethylene blends (A.S.T.M. D 676-47T)

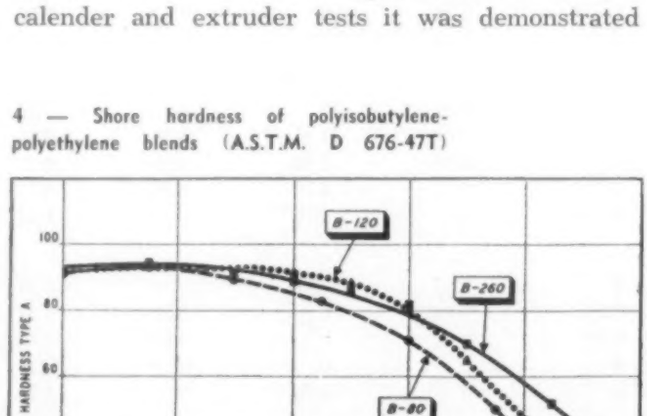


Table IV.—Permeability to Moisture[a] of Polyisobutylene-Polyethylene Films.

Polyisobutylene in blend	*Permeability to moisture of 4-mil-thick film*		
	B-80	*B-120*	*B-260*
%	*g./24 hr./100 in.²*	*g./24 hr./100 in.²*	*g./24 hr./100 in.²*
0	1.95	1.95	1.95
15	1.10	0.25	0.36
30	2.06	0.28	0.20
40	.....	0.23	0.49
45	0.27	.....	.....
50	.....	0.30	1.04
60	0.70	0.99	0.32
70	.....	0.52	0.26
75	0.49	.....	.....
85	.....	0.54	0.74
90	0.19	.....	.....
100	0.13	0.99	0.37

[a] TAPPI T464-M45 and T-465-SM44.

that best processing characteristics were obtained in the range of 40 to 60% polyisobutylene. Polyisobutylene B-120 was found to be the most desirable plasticizer because it gave good processing rates with good swell index.

Heat resistance

In Table I are shown some data on the heat resistance of these blends when exposed to 150° C. for 7 days. Polyethylene is known to be excellent, showing little breakdown even after long periods of exposure. The addition of polyisobutylene affects this property adversely. As the concentration of the latter polymer increases, the weight loss becomes greater.

The 3.4% weight loss that was exhibited by polyethylene is probably mostly due to the stabilizer (Deenax), stearic acid, and wax, these being 3.14% of the formulae. B-120 appeared better than either B-80 or B-260, showing only 3.78% loss at 50% con-

Table V.—Flex Resistance[a] of Polyisobutylene-Polyethylene Blends.

Polyisobutylene in blend	*Number of flexes to failure*		
	B-80	*B-120*	*B-260*
%			
0	1500	1500	1500
15	900	140	100
30	900	140	100
40	.....	140	100
45	900	.....	.....
50	.....	170	240
60	7500	580	470
70	.....	1490	5550
75	7500	.....	.....
85	.....	8550	32.180
90	21,900	.....	.....
100	21,900	43,880	58,200

[a] Tests made with De Mattia flexing machine in accordance with A.S.T.M. D 430-40.

centration if the stabilizer, wax, and stearic acid were discounted.

Low temperature flexibility

Polyethylene is widely publicized for its low temperature flexibility. Polyisobutylene is also considered to be excellent. Tests conducted using the A.S.T.M. Bell brittleness test gave some interesting results, shown in Table II. Polyethylene failed at —80° F. The substitution of polyisobutylene in concentrations as low as 15% raised this point 10 degrees F. However, in all concentrations a satisfactory low temperature flexibility below —50° F. was obtained. Again B-120 appeared to hold a slight, perhaps questionable, edge.

A.S.T.M. stiffness

It has been previously pointed out that the polyisobutylenes tended to raise the brittle temperature of the polyethylene. It is interesting to observe in Figs. 11 and 12 the effect of blending on the stiffness of polyethylene. These data indicate that through the

Table VI.—Chemical Resistance of Polyisobutylene-Polyethylene Blends.

Polyisobutylene in blend	*Changes in thickness, diameter, and weight of blends on immersion for 7 days*								
	B-80			*B-120*			*B-260*		
	Thickness	*Diameter*	*Weight*	*Thickness*	*Diameter*	*Weight*	*Thickness*	*Diameter*	*Weight*
%	%	%	%	%	%	%	%	%	%
30% Sulfuric Acid									
0	0.73	0	—0.25	0.73	0	—0.25	0.73	0	—0.25
15	0	0	—0.36	1.52	0	0.05	0	0	0.01
45	0	0	0.11	0	0	0.09	0	0.19	0.11
75	0	0	0	0	0.49	0.01	0	0.59	0.02
3% Sulfuric Acid									
0	—0.97	0	—0.25	—0.97	0	—0.25	—0.97	0	—0.25
15	0	0	0	0	0	0.01	0	0.09	0.11
45	0	0	0.85	0	0.19	0.10	0	0.09	0.18
75	0	0	0.59	0	0.58	0.02	1.37	0.29	0.14
100	0.48	0	0	1.32	1.12	0.13	5.0	0.50	0.11
10% Sodium Hydroxide									
0	—0.93	0	0.93	—0.93	0	0.93	—0.93	0	0.93
15	0	0	0	0	0.69	0.55	0	0.29	0.11
45	0	0	0.60	0	0	0.08	0	0.09	0.11
75	0	0	0.60	0	0.19	0.24	0	0.19	0.09
100	0.78	0	0.12	1.10	0.68	0.19	1.18	0.10	0.11
1% Sodium Hydroxide									
0	0	0	—0.16	0	0	—0.16	0	0	—0.16
15	0	0	—0.39	0	0.29	0	1.64	0.19	0.48
45	0	0	0.61	0	0.29	0.18	0	0.29	0.85
75	0.14	0	0.46	0	0	0.04	0	0.59	0.09
100	0.28	0	0	0	0	0.23	2.82	0	0.20
95% Ethyl Alcohol									
0	0	0	—0.25	0	0	—0.25	0	0	—0.25
15	0	0	—0.82	0	0.29	—0.10	1.45	0.29	0.15
45	0.46	0	—0.29	0	0	0.08	1.64	0.09	0.18
75	0.28	0	—0.15	0	0	0	1.33	0.68	0.15
100	0.15	0	—0.39	0	0	0	1.22	0.50	0.17
50% Ethyl Alcohol									
0	—0.13	0	—0.17	—0.13	0	—0.17	—0.13	0	—0.17
15	0	0	—0.88	0	0.29	0.16	0	0.29	0.17
45	0	0	—0.19	0	0.29	0.51	0	0.19	0.23
75	0.14	0	—0.14	0	0	0	0	0.29	0.20
100	0.44	0	0.55	0	0	0	3.95	0	0.59
Acetone									
0	—0.29	0	0.57	—0.29	0	0.57	—0.29	0	0.57
15	0	0	1.30	4.4	0.59	1.59	1.56	0.09	1.51
45	0	0	1.10	0	0	1.92	1.37	0.68	2.48
75	0.42	0	2.60	2.9	0.28	2.58	1.33	0.58	2.78
100	0.61	0	3.00	3.1	0.29	2.58	4.77	0.30	2.98

[a] A.S.T.M. D 543-43.

use of polyisobutylene the flexibility of polyethylene can be improved at the temperatures tested. It is, however, reasonable to presume that as the temperature is lowered this effect becomes less pronounced and at the brittle temperature there may be little, if any, change.

Gas permeability

Interesting results are shown in Table III on the gas permeability of these blends. The general trend was in all cases toward improvement of the resistance to gas transfer by substitution of polyisobutylene for polyethylene.

Water vapor transfer

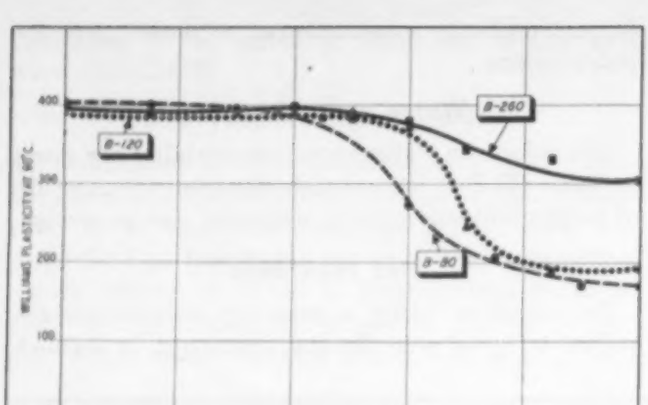
The effects on water vapor permeability are given in Table IV. It is immediately apparent that the use of polyisobutylene greatly improves this property.

Flex resistance

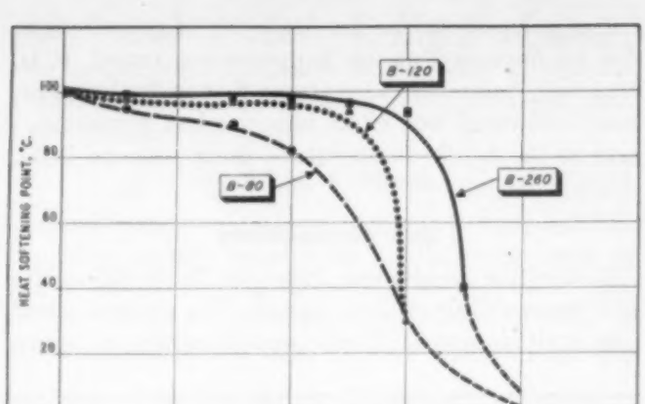
Polyethylene, being a very dry polymer, is expected to show poor flexing properties. It seemed,

Table VI.—(Continued).

Polyisobutylene in blend	*Changes in thickness, diameter, and weight of blends on immersion for 7 days*								
	B-80			*B-120*			*B-260*		
	Thickness	*Diameter*	*Weight*	*Thickness*	*Diameter*	*Weight*	*Thickness*	*Diameter*	*Weight*
%	%	%	%	%	%	%	%	%	%
Ethyl Acetate									
0	0	0	2.3	0	0	2.3	0	0	2.3
15	0	0	3.5	1.5	0.39	4.62	1.49	0.78	4.52
45	0.76	0	8.9	1.8	1.47	7.55	4.17	1.98	9.13
75	0.12	0	13.0	8.46	0.78	11.68	9.73	1.27	12.49
100	0.67	0	16.0	13.64	1.28	16.66	14.3	2.93	16.75
Ethylene Dichloride									
0	0	0	6.2	0	0	6.2	0	0	6.2
15	0	0	10.3	2.9	0.39	15.4	2.94	1.76	10.58
45	0.66	0	22.0	8.8	2.68	17.7	9.86	2.53	23.1
75	0.16	0	38.0	16.9	2.68	33.3	18.93	2.36	32.8
100	0.14	—0.11	48.0	17.8	3.34	48.3	19.28	5.84	45.6
Carbon Tetrachloride									
0	0.30	0	9.4	0.30	0	9.4	0.30	0	9.4
15	0.30	0	56.0	10.3	5.56	91.5	14.05	1.09	64.4
45	0.14	0	61.0	25.6	7.82	115.2	38.7	1.19	172.7
75		partially soluble		28.6	3.28	210.1		partially soluble	
100		completely soluble			completely soluble			completely soluble	
Toluene									
0	0	0	12.9	0	0	12.9	0	0	12.9
15	0	0	22.2	9.2	3.3	33.4	9.19	5.57	24.2
45	0	0	9.7	20.6	5.1	49.1	29.2	10.9	61.2
75		partially soluble		23.5	2.8	47.9		partially soluble	
100		completely soluble			completely soluble			completely soluble	
Heptane									
0	0.14	0	8.8	0.14	0	8.8	0.14	0	8.8
15	0	0	15.0	8.4	3.1	24.4	7.46	5.57	16.43
45	0	0	5.0	18.9	3.6	49.8	34.2	12.5	47.4
75		partially soluble		24.6	3.8	25.8		partially soluble	
100		completely soluble			completely soluble			completely soluble	
10% Sodium Chloride									
0	0.14	0	0.89	0.14	0	0.89	0.14	0	0.89
15	0	0	0.18	0	2.1	5.1	0	0.29	0.08
45	0	0	0.96	5.6	7.1	5.6	0	0.29	0.11
75	0	0	0.47	6.8	0.9	11.7	0	0.29	0.06
100	0.44	0	0.11	2.2	1.9	1.2	0	0.91	0.25
Distilled Water									
0	0	0	0.64	0	0	0.64	0	0	0.64
15	0	0	0.15	0	0	0.4	0	0.29	0.39
45	0	0	0	0	0	0.9	0	0.39	0.24
75	0	0	0.14	0	0	0.3	0	0.29	0.23
100	0.46	0	0	0	0	0.8	0	0.91	0.32



5 — Williams plasticity of polyisobutylene-polyethylene blends (A.S.T.M. D 926-47T)



6 — Heat softening of polyisobutylene-polyethylene blends

however, that polyisobutylene should improve this. DeMattia flex tests were run at room temperature at 300 flexes per minute. The results are given in Table V. The only improvement that could be noted was when the blends were predominantly polyisobutylene.

Chemical resistance

Results of tests on chemical resistance are shown in Table VI. They bear out what might be predicted from a knowledge of the two polymers. Polyethylene is relatively insoluble in most solvents and resistant to acids, alcohols, and bases. Polyisobutylene is soluble in chlorinated hydrocarbons, aliphatics, and aromatics. The result of blending is a dilution of polyethylene and with increasing concentration of polyisobutylene the solubility in carbon tetrachloride, ethylene dichloride, toluene, ethyl acetate and heptane is raised. In acids, bases, and distilled water there seems to be relatively no change.

Polyethylene blends

Using the procedures of blending and testing as

(*Please turn to page* 182)

Table VII.—Properties of Blends of Polyethylene with Low Molecular Weight Polyisobutylene and Butyl Rubber.

	Blend 1	*Blend 2*	*Blend 3*	*Blend 4*	*Blend 5*	*Blend 6*	*Blend 7*
Polyethylene (PM-1)	100	100	100	100	100	100	100
LMW Polyisobutylene (B-12)	.....	5	10	.....	.....	.....	.....
Butyl rubber (GR-I) (476)	.....	.....	.....	5	10	.....	.....
MMW Polyisobutylene (B-100)	.....	.....	.....	.....	.....	5	10
Deenax	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Extrusion[d] data at 220° F.							
In./min.	41	43	42	41	43	39	38
G./min.	99	103	100	99	100	96	90
Appearance	Inter-mediate	Inter-mediate	Inter-mediate	Inter-mediate	Inter-mediate	Inter-mediate	Inter-mediate
Extrusion[d] data at 280° F.							
In./min.	36	36	32	34	39	39	40
G./min.	94	94	86	84	102	96	98
Appearance	Inter-mediate	Inter-mediate	Inter-mediate	Inter-mediate	Inter-mediate	Inter-mediate	Inter-mediate
Stress-strain[a] data at room temperature							
Tensile-Elongation	1620- 573	1597- 590	1550- 603	1597- 587	1487- 583	1642- 580	1710- 610
Modulus at 100%-200%	1347-1347	1263-1263	1135-1135	1207-1207	1187-1187	1235-1235	1210-1210
Modulus at 300%-400%	1347-1347	1263-1263	1135-1145	1207-1207	1187-1187	1235-1235	1210-1210
Modulus at 500%-600%	1422-	1410-	1318-1528	1415-	1297-	1422-	1402-1118
Shore hardness[b]	91	91	91	90	93	91	90
Tear strength,[c] lb./linear in.	480	441	413	451	421	452	414

[a] These tests were made on a model L-3 Scott Tester at 77° F. and 55% relative humidity. The rate of jaw separation was 20 in./min. A.S.T.M. D 412-41.
[b] Shore A durometer, A.S.T.M. D 676-47T.
[c] A.S.T.M. D 624-44.
[d] This test was run by extruding the material through a ½ Royle extruder fitted with a 0.400-in. die and 0.300-in. core. The rate recorded was the length of tubing extruded in 1 min. at the temperature of the test.

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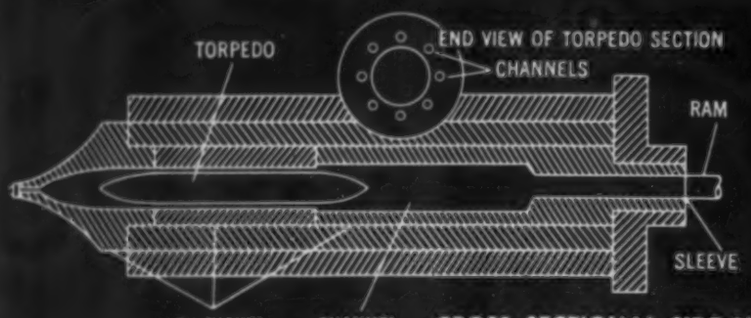

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Grading of Sheet Plastics

By Moisture Absorption and Insulation Resistance Measurements

by H. J. GREEN, JR.*

Continuous measurement of the rate and amount of moisture absorption of sheet plastic materials by exposure under controlled temperature and humidity conditions offers a rapid and accurate method of grading and selecting these materials. It is shown that cellulose acetate and laminated paper phenolic sheet follow the capillary law during absorption. A correlation between the percent moisture absorbed and the insulation resistance for these materials is presented.

MOST of the reports in the literature concerning water absorption by plastic materials have been based upon water pickup after immersion for definite periods of time. The water immersion test has become a standard method[1] for the selection and grading of material, the value for the percent moisture absorbed being an indication of the mechanical and electrical properties to be expected from material exposed to humid conditions.

Since most applications for plastics require only exposure to humidity and not exposure to water, it is clear that moisture absorption measurements made in high humidities would be of more practical value as well as of more theoretical interest than measurements made from water immersion.

An important practical application of absorption data is predicting the insulation resistance accompanying the pickup of moisture by insulating materials. This electrical property is affected greatly by small changes in the moisture content of plastic materials. Many electronic instrument failures are due to breakdowns of the insulation.

It is the purpose of this paper to present a rapid method for the grading of plastic sheet, particularly laminated paper-base phenolic sheet, and to correlate moisture absorption measurements with insulation resistance measurements. Current work on other plastics is expected to yield similar data.

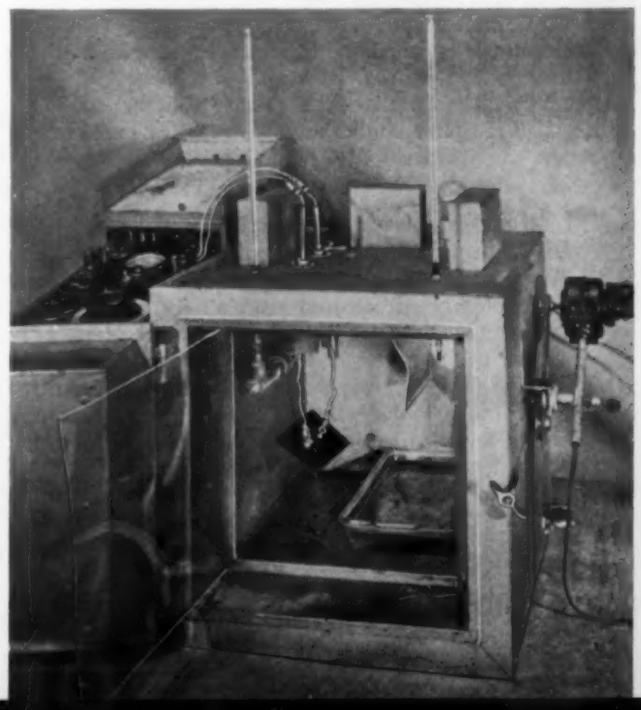
Materials and apparatus

The materials examined were polished laminated paper-base phenolic sheet and cellulose acetate sheet, obtained from commercial sources. The specimens measured 3 by 4 in. by the thickness of the material, which ranged from 0.017 to 0.250 inch.

The apparatus (Fig. 1) consisted of a humidity chamber made of wood and lined with sheet copper. The chamber was insulated with a 3-in. thickness of sawdust and was heated by a 100-watt electric bulb controlled by a thermo-regulator to maintain 30 to 31° C. To eliminate condensed water vapor, as would be the case in 100% relative humidity, a relative humidity of 97% was used. The relative humidity was maintained at 97% by using a saturated solution of potassium sulphate. A fan attached to an electric motor through the side of the chamber served to maintain equilibrium between the air in the chamber and the solution. Openings in the top of the chamber were made for a dry-bulb thermometer, a wet-bulb thermometer, the stirrup rod from a sensitive torsion balance, and a turntable spindle for operating a table holding four samples. The turntable enabled moisture absorption measurements to be made on each of four samples held radially on a disk by means of wire supports. The brass knob attached to the spindle on top of the chamber was used to change the samples by lifting,

(*Please turn to page* 167)

1 — Apparatus used to make moisture absorption measurements



* Materials Engineering Dept., Stromberg-Carlson Co.
[1] A.S.T.M. Designation: D 570-42.

PLASTICS DIGEST*

Abstracts from the world's literature of interest to those who make or use plastics or plastics products. Send requests for periodicals to the publishers listed

General

VINYON N RESIN AND FIBERS. E. W. Rugeley, T. A. Feild, Jr., and G. H. Fremon. Ind. Eng. Chem. *40*, 1724-31 (Sept. 1948). Greatly improved solvent resistance, better dye affinity, and higher softening points were achieved in vinyl fibers without sacrificing the high strength, nonflammability, exceptional chemical resistance, and immunity to rot and mildew that characterize earlier fibers of the vinyl family. These improvements are obtained by exploiting two unusual properties of the vinyl chloride-acrylonitrile copolymer resin from which the new fibers are made. In the form of filaments or films, this resin shows a pronounced rise in softening point as a result of molecular orientation, and it becomes insoluble and shows a further rise in softening point upon exposure to elevated temperatures.

ION EXCHANGE RESINS. C. W. Davies. Chem. & Ind. *1948*, 51-4 (Jan. 24). Ion exchange resins are valuable tools both in large scale work and in the laboratory, and new uses are continually being proposed. Their value in pure research has not yet been fully appreciated. An exchange ion is a porous solid, insoluble in all common solvents, of known chemical parentage and probably obtainable in a more pure and homogeneous state than the natural surface active materials. The framework is, for most chemical purposes, chemically inert, and the active groups are almost infinitely variable as to number, position, and chemical character. This should be of great advantage in the theoretical study of heterogeneous catalysis, of base exchange, and of all those surface and colloid problems for which the properties of the electrical double layer are fundamental. Twenty-three references.

POLYMERIZATION. C. C. Winding. Ind. Eng. Chem. *40*, 1643-9 (Sept. 1948). The fundamentals of polymerization are reviewed; 151 references.

PLASTICS AS PAPER COATINGS. W. H. Aiken. Modern Packaging *21*, 193-7 (July 1948). The properties of available plastic materials used to coat paper are examined for characteristics needed for packaging applications.

NEW TRENDS IN FURNITURE. Plastics (London) *12*, 300-3 (June 1948). Some applications of plastics in the construction of furniture in England are described.

Materials

ALLYL ETHERS OF CARBOHYDRATES. A. N. Wrigley and E. Yanovsky. J. Amer. Chem. Soc. *70*, 2194-6 (June 1948). Completely substituted allyl ethers of erythritol, xylitol, arabitol, dulcitol, talitol, and iditol were prepared. With the increase of the chain from three to six carbons, the gelation time decreased, from 974 min. for allylglycerol to 900 for erythritol, to 602 for pentitols, and 502 for hexitols. On the other hand, the rate of oxygen absorption decreased with the increase of the length of carbon chain. The relation between the configuration and the time of gelation of isomeric allyl ethers is not quite clear. The possibility of the formation of acrylic ester during the oxidative polymerization of allyl ethers is suggested.

P. V. C. PASTE. D. K. Baird. British Plastics *20*, 167-71 (Apr. 1948). The properties and processing procedures for polyvinyl chloride paste are discussed. The types of paste are described. The processing procedures are described in detail.

Plasticizers

PLASTICIZERS FOR RUBBERS AND RESINS. P. B. Stickney and L. E. Cheyney. J. Polymer Sci. *3*, 231-45 (Apr. 1948). The mechanism of plasticizer action is discussed for linear and slightly and highly crosslinked polymers. The important factors considered are the flexibility of the polymer chain, the polar interaction of groups along the chain, the masking of these interactions by plasticizer molecules, and the importance of the relative shape of polymer unit and plasticizer in the effectiveness of separating the chains. For nonpolar polymers, without secondary valence cross links, the plasticization is largely an entropy effect since no secondary valence bonds are broken or formed.

Applications

TRANSFORMER SIZE AND WEIGHT REDUCED WITH SILICONE INSULATION. J. F. Dexter, M. L. Manning, and H. P. Walker. Electrical Manufacturing *41*, 90-1 (June 1948). Transformers made with silicone resins are smaller in size and operate at higher temperatures than other transformers.

PLASTICS FOR PEROXIDE. Modern Packaging *21*, 114-15 (July 1948). Some of the parts on a machine for packaging hydrogen peroxide are made from methyl methacrylate and saran plastics.

ION EXCHANGE DEVELOPS AS A UNIT PROCESS. J. C. Winters. Chem. Ind. *62*, 754-8 (May 1948). Applications of synthetic ion exchange resins in chemical manufacturing.

Coatings

THERMOSET VARNISH. G. F. Sutton and M. F. Hertel. Westinghouse Engineer *8*, 124-8 (July 1948). The properties and application of some phenolic thermosetting resin varnishes are discussed.

TRENDS IN OIL-MODIFIED ALKYDS. E. O. Philips. Chem. & Ind. *1948*, 3-5 (Jan. 3). The variations in oil-modified alkyd resins and the important basic raw materials are discussed. Twenty-six references.

MEASUREMENTS OF ADHERENCE OF ORGANIC COATINGS TO METAL SURFACES. H. Green and T. P. Lamattina. Analytical Chem. *20*, 523-7 (June 1948). An instrument and a method of measuring the adherence of organic coatings to metal surfaces are described. The property of adherence, as used here, is not synonymous with the

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term "adhesion." Adherence is derived from a number of factors, of which adhesion is but one. The other factors include plastic resistance to flow, tear resistance, and mechanical entrapment of the coating in the roughness of the metal surface.

THE PENTAERYTHRITOL-DIBASIC ACID REACTION. G. R. Cornish. Chem. & Ind. *1948*, 39-42 (Jan. 17). The physical chemistry, molecular size, structure, properties, and synthesis of alkyd resins made from pentaerythritol and dibasic acids are discussed. Twenty-four references.

Properties

POLYETHYLENE PERMEABILITY. J. H. Parliman. Modern Packaging *21*, 198-201, 240, 242 (July 1948). The permeability of polyethylene film to 48 liquids is reported. The permeabilities range from 0.02 g/24 hr./100 in.^{2}/mil for ethylene glycol to 5200 g/24 hr./100 in.^{2}/mil for carbon disulfide.

BACTERIAL DEGRADATION OF SODIUM CARBOXYMETHYLCELLULOSE AND METHYL ETHYL CELLULOSE. G. G. Freeman, A. J. Baillie, and C. A. Macinnes. Chem. & Ind. *1948*, 279-82 (May 1). Solutions of sodium carboxymethylcellulose and methyl ethyl cellulose are degraded by the growth of bacteria found in soil and normally present in manufactured soluble cellulose derivatives. The degradation of these materials and growth inhibitors of the bacteria were investigated.

ABSORPTION OF ORGANIC VAPORS BY THIN FILMS OF POLYSTYRENE. E. C. Baughan. Trans. Faraday Soc. *44*, 495-506 (July 1948). Measurements of the vapor-pressure equilibrium of organic vapors absorbed by thin films of polystyrene are presented. The technique consisted of weighing thin films of the polymer, on suitable supports, at measured vapor pressures of the low molecular component; these were obtained by solution of the non-volatile compound, butyl sebacate. The apparatus could not give temperature coefficients sufficiently precisely; results are therefore confined to free-energy data at one temperature (20° C.), but cover several vapors ranging from those of liquids (benzene, toluene, *m*-xylene, carbon tetrachloride, butyl acetate, dioxane, diethylketone) in which polystyrene dissolves (at 20° C.) to those of liquids (cyclohexane, propyl ether, nitromethane) in which it will only swell. It is shown that polystyrene is a true "molecular-colloid" (mainly by the work of Staudinger and Schulz) and the remarkable deviations from Raoult's law in such solutions is analyzed in terms of a) the entropy contributions arising from the great molecular weight and the flexibility of the polymer together with b) the usual heat of mixing effects well known in low-molecular solutions.

FILMS FOR CHERRIES. F. Gerhardt and T. R. Wright. Modern Packaging *21*, 163-5, 214, 216, 218 (June 1948). The water vapor and carbon dioxide transmission characteristics of plastic films made of rubber hydrochloride, cellulose acetate, regenerated cellulose, and polyethylene are reported.

Testing

DETERMINATION OF REFRACTIVE INDEX OF POLYMERS. R. H. Wiley and P. H. Hobson. Analytical Chem. *20*, 520-3 (June 1948). The Abbe refractometer is used extensively for the determination of the refractive indexes of both opaque and transparent polymers. The determi-

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nation requires the use of a specimen with polished surfaces or a film of the polymer, solvent, or melt cast on the prism of the instrument or on a glass form. Transmitted or totally reflected light or the grazing incidence technique is used. Immersion methods have also been developed. Other methods for determining the refractive index of polymers are also used. This discussion summarizes and correlates the salient features of the various procedures and the preferred techniques used for specific polymer types.

INSTRUMENTS FOR MEASURING STRESS RELAXATION OF HIGH POLYMER MATERIALS. W. S. Macdonald and A. Ushakoff. Analytical Chem. *20*, 713-17 (Aug. 1948). A compact instrument is described for measuring stress relaxation of high polymer materials. It contains a minimum of moving parts, is essentially free from draft and vibration effects, and measures the relaxation characteristics of a substance under constant strain (constant sample deflection).

SOME OBSERVATIONS ON THE FORMVAR REPLICA METHOD, WITH A NOTE ON GLASS SURFACES. B. M. Deacon, S. G. Ellis, W. G. Cross, and R. S. Sennett. J. Applied Phys. *19*, 704-12 (Aug. 1948). A study of the capabilities and limitations of the Formvar replica method was made with particular reference to shadow cast Formvar replicas. Observations were made on the dependence of the deduced surface structure on the method of replication of the surface and the method of shadow casting the replica. The most suitable thickness of Formvar and evaporated metal film was studied for various surfaces. Other replica methods are summarized and compared with Formvar replica methods. The structure of glass surfaces, both polished and fractures, is briefly discussed on the basis of observations made from Formvar replicas.

POLAROGRAPHIC DETERMINATION OF FREE MONOMER IN HETEROPOLYMERIZATION REACTION MIXTURES. G. C. Whitnack. Analytical Chem. *20*, 658-61 (July 1948). Free or uncombined monomers in heteropolymerization reaction mixtures of maleic anhydride with styrene and vinyl acetate, respectively, were quantitatively determined by the polarographic method of analysis. By using standard polarographic linear curves as little as 0.01% of free monomer was determined within 3 to 5 percent. Data for numerous samples of polymer showed the method to be rapid, accurate, and applicable in control work. The rate of reaction and ratio of monomers was conveniently studied with the polarograph. Photographs of typical Micromax recordings illustrate the type of polarogram obtained and the reproducibility of analyses.

APPLICATION OF FLOW BIREFRINGENCE MEASUREMENTS TO HIGH-POLYMER SOLUTIONS. M. Wales. J. Phys. & Colloid Chem. *52*, 976-82 (June 1948). Flow birefringence data from the literature are briefly reviewed. It is shown that flow birefringence data can be used as a secondary method of molecular weight determination, in analogy to the intrinsic viscosity. Two different average molecular weights are obtained from flow birefringence, in contrast to the intrinsic viscosity. The type of average is discussed.

Chemistry

POLYMERIC AMIDES FROM EPSILON-CAPROLACTAM. W. E. Hanford and R. M. Joyce. J. Polymer Sci. *3*, 167-72 (Apr. 1948). ε-Caprolactam is converted to ε-aminocaproic acid polymer by heating under pressure with water fol-

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lowed by distillation of the water and heating at atmospheric pressure. The lactam is also polymerized directly to this polymer by a catalytic method in which sodiocaprolactam is the initiator.

EXPERIMENTAL STUDY OF COPOLYMERIZATION. P. Agron, T. Alfrey, Jr., J. Bohrer, H. Haas, and H. Wechsler. J. Polymer Sci. *3*, 157-66 (Apr. 1948). To study the effect of structure on monomer reactivities in copolymerization the copolymer composition as a function of initial monomer mixture composition was determined for the following monomer pairs: vinyl acetate—vinyl chloride, ethyl methacrylate—vinylidene chloride, butyl methacrylate—vinylidene chloride, vinyl acetate—tetrachloroethylene, allyl chloride—vinylidene chloride, vinyl acetate—vinylidene chloride, methyl methacrylate—vinyl chloride, pentene-1—vinyl chloride, allyl chloride—vinyl acetate, methyl methacrylate—2,5-dichlorostyrene, vinyl chloride—vinylidene chloride, and vinyl chloride—dioctyl maleate.

VINYLTHIOPHENES. G. B. Bachman and L. V. Heisey. J. Am. Chem. Soc. *70*, 2378-80 (July 1948). A number of halogenated thiophene alcohols were prepared and dehydrated to the corresponding vinyl halogenated thiophenes to study the polymerization and copolymerization characteristics of these olefins. The propenyl compound did not polymerize or copolymerize with styrene, methyl methacrylate, vinyl acetate, or maleic anhydride. The isopropenyl compounds did not polymerize but did copolymerize. Those compounds with the isopropenyl group in the two-position and with a halogen in the five-position polymerized on long exposure to sunlight. The vinylthiophenes polymerized and copolymerized normally. Rubbery copolymers were formed with butadiene.

VINYLPYRIDINES AND VINYLQUINOLINES. G. B. Bachman and D. D. Micucci. J. Am. Chem. Soc. *70*, 2381-4 (July 1948). A series of vinylpyridines and vinylquinolines, some containing nuclear halogens, were prepared and a preliminary study made of their polymerizing and copolymerizing characteristics.

Synthetic rubber

ELECTRICALLY-CONDUCTIVE RUBBER. Materials & Methods *28*, 60-1 (July 1948). An electrically-conductive rubber is made by incorporating acetylene carbon and strips of aluminum foil. The material fabricated into a laminate with other materials is used mainly for radiant heating panels in residential construction. It also serves as a grounding device for the static electricity generated by moving parts of machinery.

Molding and fabricating

HIGH-FREQUENCY WELDING OF CELLULOSE ACETATE SHEET. H. P. Zade and V. Stannett. Plastics (London) *12*, 398-402 (Aug. 1948). A high-frequency device for welding cellulose acetate plastic sheet is described.

POST FORMING LAMINATES. N. W. Knewstubb. British Plastics *20*, 161-6 (Apr. 1948). The construction, properties, and method of forming post-forming laminates are reviewed.

PRINTING ON PVC. British Plastics *20*, 179-82 (Apr. 1948). A screen printing process for printing on polyvinyl chloride sheet is described.

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ESTER POLYMER. R. C. Morris, R. M. Horowitz, and A. V. Snider (to Shell Development Co.). U. S. 2,445,627, July 20. A normally liquid polymer of diallyl 3-methyl-1,2,3,6-tetrahydrophthalate.

COATING. A. L. Rummelsburg (to Hercules Powder Co.). U. S. 2,445,637, July 20. A varnish comprising a drying oil, a phenol-formaldehyde resin, and a solvent containing allo-cymene.

PLASTIC COMPOSITION. F. J. Soday (to United Gas Improvement Co.). U. S. 2,445,642, July 20. A plastic composition comprising a cellulose ester or ether and a carboxylic acid ester of indanol or derivative thereof.

HYDROCARBON RESINS. F. J. Soday (to United Gas Improvement Co.). U. S. 2,445,643-4, July 20. A coating comprising a drying oil and a hydrocarbon resin polymer.

ALLYL ALCOHOL POLYMERS. R. R. Whefstone (to Shell Development Co.). U. S. 2,445,652, July 20. The beta-cyanoethyl ether of a polymer of a beta, gamma-monoolefinic monohydric alcohol.

COUMARONE-TYPE RESINS. H. L. Allen and H. G. Kleinguenther (to Allied Chemical and Dye Corp.). U. S. 2,445,654, July 20. Recovery of resins formed during sulfuric acid polymerization of indene, coumarone, and the like, by heating in the presence of urea or in the presence of thiourea.

PLASTIC TREATMENT. C. W. Leguillon (to B. F. Goodrich Co.). U. S. 2,445,677, July 20. Apparatus for compacting plastic about a band of tensioning members.

RESINOUS BODIES. W. H. Willert (to Firestone Tire and Rubber Co.). U. S. 2,445,726, July 20. Extruding a preform having all dimensions greater than ⅛ in. of a crystalline resin polymer and stretching below the softening point thereof.

MOISTURE-PROOF FILM. S. M. Kinzinger (to Firestone Tire and Rubber Co.). U. S. 2,445,727, July 20. A flexible, transparent, moisture-proof film comprising a copolymer of butadiene-1,3 and acrylonitrile, a homopolymer of vinyl chloride or copolymers thereof, and a microcrystalline wax.

DIOXOLANE RESINS. M. R. Radcliffe and W. G. Mayes (to Firestone Tire and Rubber Co.). U. S. 2,445,733, July 20. Resinous polymers of dimethylene dioxolanes or copolymers thereof with acrylonitrile or vinylidene chloride.

DICHLOROBUTANE RESINS. G. P. Rowland and R. J. Reid (to Firestone Tire and Rubber Co.). U. S. 2,446,739, July 20. An oriented crystalline polymer of 2,3-dichlorobutadiene-1,3 together with a mercaptol or mercaptal.

MOLDING MACHINE. J. Hoch (to Victor Metal Products Co.). U. S. 2,445,742, July 20. Molding plastic articles by molding pellets from resin powder, moving through an induction field, and molding.

POLYMERS. G. F. D'Alelio (to General Electric Co.). U. S. 2,445,764, July 27. The copolymerizate of diallyl maleate and diethylene glycol maleate phthalate.

LAST. S. P. Lovell. U. S. 2,445,791, July 27. A molded shoe last comprising polystyrene mixed with rubber and rosin, a filler such as cork, cotton flock, etc., and a solvent-resistant coating.

SILICONE ELASTOMERS. J. Marsden (to General Electric Co.). U. S. 2,445,794, July 27. A solid elastomer comprising a curable hydrocarbon-substituted polysiloxane containing vinyl groups attached to silicon atoms.

SULFUR-CONTAINING POLYMERS. R. C. Morris and E. C. Shokal (to Shell Development Co.). U. S. 2,445,799, July 27. A polymer of an ester of a tetrahydrothiophene-3-ol-1,1-dioxide with an acid carbonate of an olefinic alcohol.

BELT. I. Rossi and W. Dubilier. U. S. 2,445,889, July 27. A belt of thermoplastic material reinforced with an embedded strip of thin spring metal.

LOOM SHUTTLE. O. C. Williams. U. S. 2,445,899, July 27. A molded plastic loom shuttle.

PULVERIZING METHOD. A. Sommer. U. S. 2,445,928, July 27. Apparatus for preparing minute particles of plastic.

POLYMERIZING METHOD. R. C. Reinhardt (to Dow Chemical Co.). U. S. 2,445,970, July 27. Method of polymerizing vinyl compounds in aqueous suspension of macroparticles without the aid of emulsifiers by providing adequate agitation and during the course of reaction transferring to separate zones wherein the conditions differ from preceding zones.

MOLDING. A. Amigo (to Ebonestos Industries Ltd.). U. S. 2,446,038, July 27. Apparatus for molding boxes from a packet of fibrous laminations of felted fibrous material impregnated with synthetic resins.

MOLDING PRESS. L. H. Blanchard. U. S. 2,446,041, July 27. A molding press for molding plastic materials.

COPOLYMER. E. L. Kropa (to American Cyanamid Co.). U. S. 2,446,049, July 27. A copolymer of isopropenyl toluene and an acrylic compound.

REINFORCED PLASTICS. E. White, R. Steinman, and L. B. Biefeld (to Owens-Corning Fiberglas Co.). U. S. 2,446,119, July 27. Synthetic resin sheets reinforced with glass fibers.

PLASTIC COMPOSITIONS. D. E. Adelson and H. Dannenberg (to Shell Development Co.). U. S. 2,446,121, July 27. A composition of cellulose nitrate plasticized with polyallyl acetate. (*Please turn to next page*)

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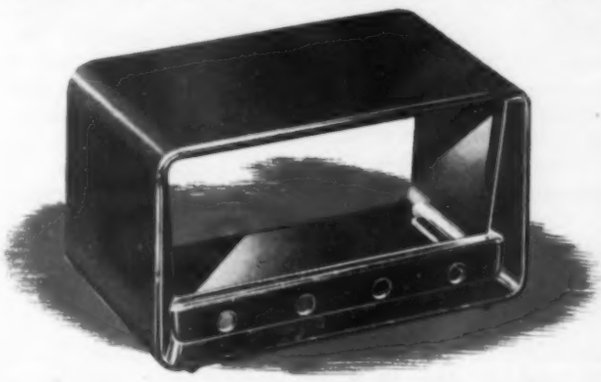

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SILICON POLYMERS. J. F. Hyde (to Corning Glass Works). U. S. 2,446,135, July 27. Preparation of organosilicon copolymers by adding an aqueous solution of a hydrolysis catalyst to a mixture of ethyl orthosilicate and dimethyl diethoxy silane.

RESINS. R. H. Barth (to Heyden Chemical Corp.). U. S. 2,446,257, Aug. 3. A compound consisting of an ester-acetal of polypentaerythritol.

CUSHION LINING FOR DENTURES. A. A. Nelson. U. S. 2,446,298, Aug. 3. An artificial denture base of hard methyl methacrylate and a soft adherent cushion lining of vinyl chloroacetate plasticized with dioctyl phthalate, butylphthalyl butyl-glycollate, and dibutyl phthalate.

WOOD COMPOSITE. C. Roman. U. S. 2,446,304, Aug. 3. A wood product composed of a binder and a mass of comminuted wood resulting from hammer-milling of hog fuel mixed with bark and leaves.

COATING. J. K. Wagers and E. C. Shokal (to Shell Development Co.). U. S. 2,446,314, Aug. 3. Coating polymerizable at 50 to 100° C. in presence of a peroxide catalyst, comprising a soluble diallyl ester of a dicarboxylic acid in organic solvent medium.

POLYMERS. W. E. Mochel (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,446,382, Aug. 3. Synthetic elastomers comprising polymers of 2-fluoro-1,3-diene or copolymers thereof with vinyl compounds, said elastomers being obtained by emulsion polymerization in the presence of 2,2-difluorobutene-3.

CELLULAR RESIN. J. D. Nelson and P. V. Steenstrup (to General Electric Co.). U. S. 2,446,429, Aug. 3. Cellular phenolic resin prepared by mixing an aqueous mass of acid-curing thermosetting phenol-aldehyde prepolymer, a water-soluble carbonate, and a water-soluble sulfonic acid and allowing the mass to expand.

COPOLYMER FILMS. P. E. Hardy (to Standard Oil Development Co.). U. S. 2,446,536, Aug. 10. A thin film of styrene-isobutylene copolymer, the surface of which has been nitrated to provide improved solvent resistance to fatty oils.

SOUND RECORDS. C. Eddison (to Radio Corp. of America). U. S. 2,446,578, Aug. 10. A sound record composed of cellulose acetate, pinewood resin, and methyl abietate; said components being ground, mixed with filler, and processed.

ADHESIVE. L. J. Gold and S. Zweig (to Milprint, Inc.). U. S. 2,446,581, Aug. 10. A heat-activated adhesive comprising a polyalkylene glycol and an alkyd resin toughener.

HIGH-FREQUENCY APPARATUS. E. H. Welch, Jr. (to United Shoe Machinery Corp.). U. S. 2,446,623, Aug. 10. A high-frequency apparatus for the progressive bonding of plastic materials.

SHEET ORNAMENTATION. T. M. Knowland (to Boston Woven Hose and Rubber Co.). U. S. 2,446,771, Aug. 10. A continuous process for ornamentally surface-finishing thermoplastic sheets.

WATER-REPELLENT FINISH. E. Abrams (to Quaker Chemical Products Corp.). U. S. 2,446,864, Aug. 10. Textile material is rendered water-repellent by treating

with a composition of a substituted urea and a solvent-soluble urea or melamine aldehyde condensate.

UREA-ALDEHYDE COMPOSITION. D. E. Cordier (to Libbey-Owens-Ford Glass Co.). U. S. 2,446,867, Aug. 10. A dry thermosetting resin comprising a urea-formaldehyde condensate and a potentially acid guanidine salt of mono-sulfonic acid of an aromatic hydrocarbon.

POLYMERIZATION. D. W. Young and H. B. Kellogg (to Standard Oil Development Co.). U. S. 2,446,897, Aug. 10. Liquid-phase polymerization of an olefinic organic compound is improved by subjecting the olefin to reaction conditions at −30 to −160° C. in the presence of a double salt of a metal chloride and a saturated monobasic fatty-acid.

MOLDING MATERIAL. E. M. Bright (to F. A. Krause). U. S. 2,446,903, Aug. 10. A molding material comprising petroleum asphalt, a plasticizing asphalt, neutralized black-liquor lignin, and filler.

POLYMERIZATION. J. C. Munday and R. V. J. McGee (to Standard Oil Development Co.). U. S. 2,446,947, Aug. 10. Isobutene trimer is prepared by polymerizing with sulfuric acid at 35 to 140° F. for 5 min. and separating.

VINYL RESINS. E. Cousins (to Wingfoot Corp.). U. S. 2,446,976, Aug. 10. A color-stable resin comprising a polymeric vinyl chloride, zinc stearate, and an alkaline earth metal or alkali metal stearate.

THERMOSETTING VINYL RESIN. T. H. Rogers, Jr. and R. D. Vickers (to Wingfoot Corp.). U. S. 2,446,984, Aug. 10. A thermoset copolymer is prepared by mixing a copolymer of vinylidene chloride and vinyl chloride with a copolymer of heterocyclic amine and heating.

MELAMINE-FORMALDEHYDE. J. R. Alexander, D. Burton, and F. Hausmann (to William Walker and Sons, Ltd.). U. S. 2,446,991, Aug. 17. Melamine-formaldehyde resin plasticized with an alkali lactate.

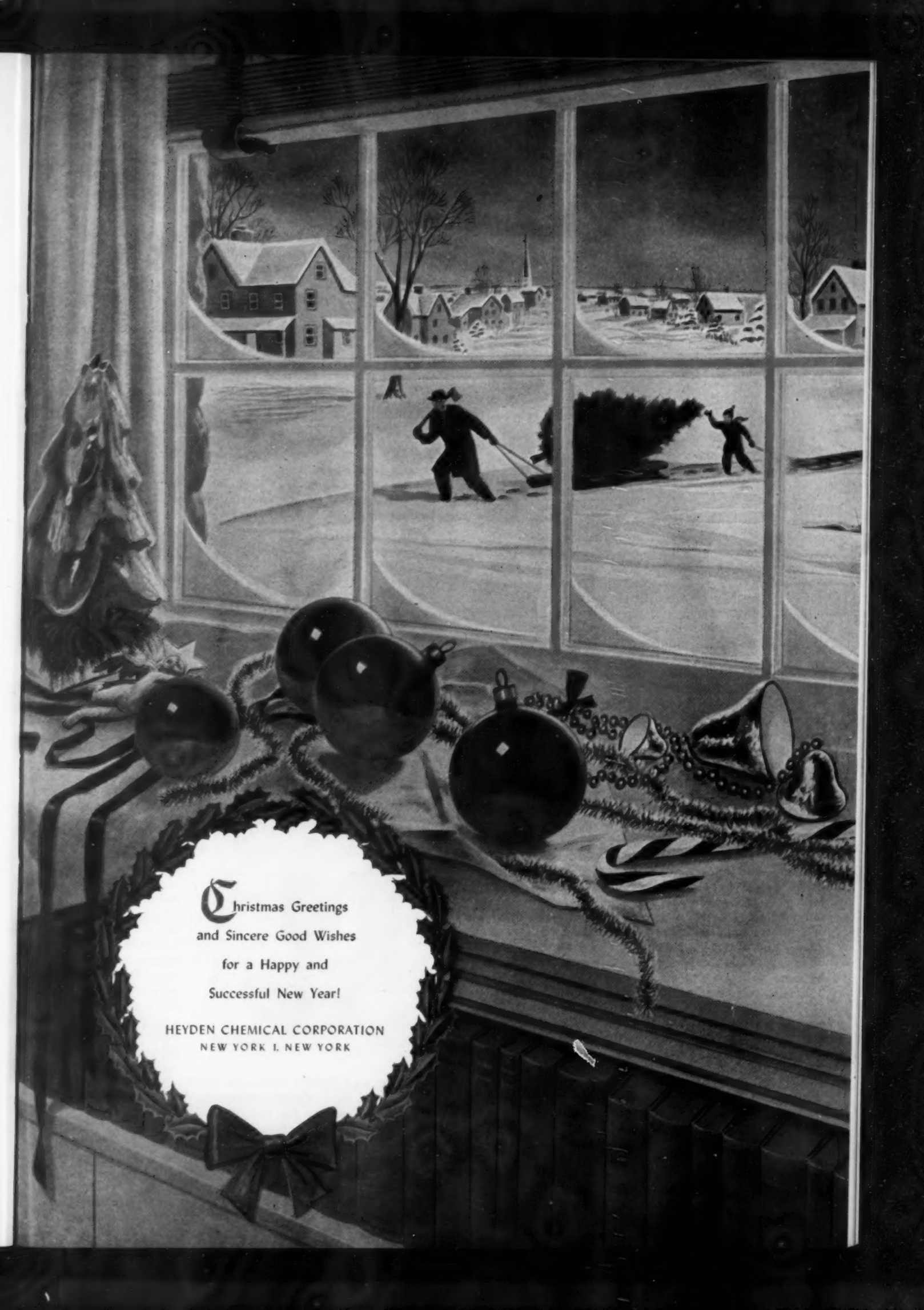
SULFO-COMPOSITIONS. B. W. Gamson (to Great Lakes Carbon Corp.). U. S. 2,447,004-5-6, Aug. 17. A hard, dense, amorphous infusible, insoluble substance prepared by mixing a hydrocarbon material with free sulfur and heating.

EXPANDED PLASTIC MATERIALS. A. Cooper (to Expanded Rubber Co., Ltd.). U. S. 2,447,055-6, Aug. 17. Expanded bodies having closed cells of thermoplastic polymer such as polystyrene and polymethyl methacrylate.

POLYVINYL ALCOHOL FILAMENTS. E. M. Shelton and W. L. Thompson (to Johnson and Johnson). U. S. 2,447,140, Aug. 17. A polyvinyl alcohol filament is conditioned to optimum moisture content, stretched just short of the breaking point, reconditioned under tension and heated at 140 to 180° C. without permitting variation either in degree of stretch or moisture content.

MOLD APPARATUS. E. R. Knowles. U. S. 2,447,256, Aug. 17. A plastics molding apparatus.

POLYMERIZATION. H. P. Staudinger and M. D. Cooke (to Distillers Co., Ltd.). U. S. 2,447,289, Aug. 17. Asymmetrically substituted ethylene is polymerized in an aqueous organic diluent containing a water-soluble fatty acid.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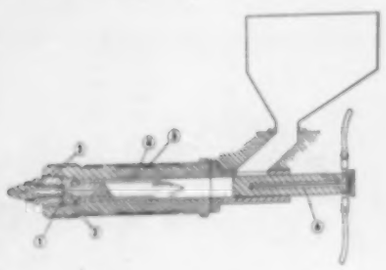
NEW YORK 1, NEW YORK

NEW MACHINERY AND EQUIPMENT

Heating cylinder—Watson-Stillman Co., Roselle, N. J., has perfected an improved heating cylinder for thermoplastic molding and made it a part of standard equipment on all Completeline injection molding machines from 4 to 80 oz. capacity. The cylinder is said to deliver capacity shots of such "de-rating" marials as polystyrene without stuffing. All surfaces in contact with plastic are chrome plated and the injection plunger is internally water cooled to prevent scoring or sticking. A tapered acme thread secures the nozzle adapter which seats firmly against maximum operating pressures and permits rapid dismantling of nozzle and torpedo for cleaning with the cylinder in place. Heat is provided by Calrod units set in grooves around the cylinder. The key to the diagram of the cylinder is as follows: 1) area of joints, 2) lapped surfaces, 3) tapered adapter, 4) chrome plate on surfaces, 5) heating units, and 6) water-cooled plunger.



Preform-plunger molding press—A combination preform-plunger molding press which can be handled by a single operator has been announced by F. J. Stokes Machine Co., 5900 Tabor Rd., Philadelphia 20, Pa. The preformer operates from the same pumping unit as the 50-ton plunger press and is said to produce preforms up to ½ lb. weight of conventional material at a rate faster than required by the press. Maximum diameter of the preform is 3 in.; depth of fill is up to 4 inches.

Belt and disk sander—For sanding plastics, metals, and wood in various shapes and sizes, Atlas Press Co., 2476 N. Pitcher St., Kalamazoo, Mich., has developed a new belt and disk sander, No. 5010. The table, which measures 7⅞ by 15 in. and tilts 45°, may be used with either disk or belt. The 10-in. diameter disk and guard can be removed for sanding wide stock on the belt. This belt operates in both horizontal and vertical positions, and guards and stop are removable for sanding curved pieces on either drum. Other specifications include: a 27 13/16 by 4-in. belt, a 4 1/4 by 11 7/8-in. belt support table, 3 1/4-in. diameter rubber-faced drums, belt speed of 1150 f.p.m., and spindle speed of 1360 f.p.m.

Band filing machine—A 7-in. capacity band filing machine with an adjustable cutting speed of 50 to 250 ft. per min, has been introduced by the DoAll Co., Des Plaines, Ill. Because women are being employed with increasing frequency to operate such machines, this band filer has a table height of 39 in. and can be used by a person seated or standing. The work table is 18 in. square and can be tilted as much as 90° for accurate miter or angle cutting. Three band sizes are available: widths of ¼, ⅜ and ½ in. in six types of cut and with flat, oval, or round shape. All sizes are 120 in. long.

Combination oscillator-press, and automatic button hole machine—Mayflower Electronic Devices Inc., 6014 Hudson Blvd., West New York, N. J., has announced a oscillator and press in one unit, and an automatic grommet or button hole machine. The oscillator-press unit is recommended for use in laboratories of plastic film manufacturers for determining whether or not the sheeting produced will weld electronically and at what frequency it will weld. It has a variable frequency shift with a range of 20 to 60 megacycles. Electronically sealed swatches indicating the proper weld frequency can be sent out with each roll of sheeting.

The button hole machine can be used where reinforcements are necessary on such articles as plastic raincoats, crib sheets, etc.

Air-operated clamp—Lapeer Mfg. Co., Lapeer, Mich., has added Model AO-400, an air-operated clamp with a maximum clamping pressure of 400 lb., to its line of Knu-Vise products. It is recommended for use where ordinary clamps would be inconvenient and in multiple installations controlled by a single valve or with sequence valves. The cylinder, Model CY-400, can be used independently of the toggle-action clamp for pushing or pulling, or to create hydraulic pressure. It has a 1½-in. bore, a 2⅜-in. stroke and is for 250 p.s.i. air pressure.

Immersion heaters—Edwin L. Wiegand Co., 7503 Thomas Blvd., Pittsburgh 8, Pa., announces a new series of Chromalox electric immersion heaters with standard pipe-threaded screw plugs for easy mounting through tank walls. They are available with built-in single or 3-heat switches, or with switches for thermostatically controlled applications. Sixteen standard copper-sheathed heaters range from 600 watts to 10 kw.; eight standard steel-sheathed heaters range from 1 to 6 kw. Screw plugs are 1¼ in. for single element heaters and 2 in. for two-element heaters.

Micrometer—Stock sheets of plastics, steel, boards, papers, glass, foils, etc., up to thicknesses of ½ in. can be calipered accurately with the new Exact Micrometer introduced by E. J. Cady & Co., 134 N. LaSalle St., Chicago 2, Ill. This instrument makes use of the dead weight principle which employs devices to maintain uniform measuring pressure at all times, at any point of anvil travel, regardless of material thickness. The pressure per sq. in. meets A.S.T.M. and TAPPI standards. Zero adjusting devices on the outside of the frame permit the indicator to be set at exact zero on the dial. The dial has a diameter of 6 in., is marked in thousandths or half-thousandths of an inch graduations, and is placed on top for convenient accurate reading.

(Please turn to next page)

WHAT we call "character" in an individual is merely the individual's real worth. Every business enterprise sooner or later establishes a "character" of its own.

Its character becomes known; people come to know it through knowledge of its principles, its methods, its aims.

Even more, it is likely to become known through the quality, high or low, of its wares.

Molders of Thermoplastics realize that production dependability is based upon these vital characteristics . . . uniformity . . . adequate strength . . . constant quality control and supervision and easy flow of their powders . . .

Gering's molding powders excel in all the requisites. They provide matchless uniformity . . . their superior strength is a matter of record, and their generally good performance results in quicker molding cycles with less rejects. Truly a matchless combination and a testimonial to Gering "character."

PLASTIC MATERIALS

GERING ENGINEERING MAKES FINE PLASTICS BETTER

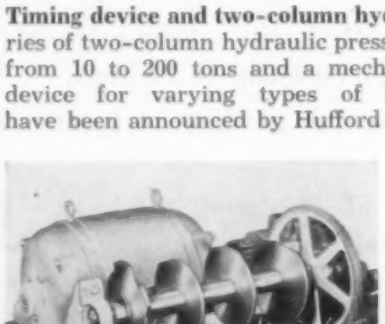
GERING PRODUCTS, Inc.

KENILWORTH CABLE ADDRESS: GERING NEW JERSEY

Preheater—A 3-kw., 40-megacycle preheater which is said to heat 40 oz. of wood-flour filled phenolic compound from 70 to 250° F. in 1 min. or 1 lb. in 24 sec. has been introduced by the Industrial Heating Div., General Electric Co., Schenectady 5, N. Y. Requiring only 2¼ sq. ft. of floor space, this portable preheater features an automatic "pop-up" cover which facilitates preform loading and unloading, two timers with associated control, separate rheostats in the filament circuit for voltage setting, and three meters. One meter indicates the direct-current applied to the oscillator circuit. Another shows safe operation of the oscillator tube. The third indicates oscillator or rectifier filament voltage.

Combination blast gun—Engineered Products Inc., 1224 Speer Blvd., Denver, Colo., has announced a Tornado combination blast gun designed for use in the automotive and industrial fields and capable of being used as a sand blaster for abrasive use, as a liquid sprayer, as a solvent applicator for cleaning use, and as a blow gun. The gun is equipped with a 3-pint container which locks into place with a quarter turn. It has a maximum air consumption of 9½ cu. ft. per min. at 100 to 150-lb. pressure. Attachments include a case-hardened nozzle for blast operations and a solvent nozzle for use with oils and chemicals.

Timing device and two-column hydraulic presses—A series of two-column hydraulic presses ranging in capacity from 10 to 200 tons and a mechanical "brain" timing device for varying types of hydraulic equipment have been announced by Hufford Machine Works, Inc., 207 N. Broadway, Redondo Beach, Calif. The timing device shown here employs a series of specially designed cams which are machined for specific operations. These motor-driven cams, mounted on a single shaft, depress the roller-bearing stems of actuating valves, thereby starting or cutting off the flow of hydraulic fluid operating the cylinders. The new presses permit variation of both daylight and column spacing from standard specifications with a minimum amount of engineering and machining. Either single or multiple ram action is possible for opposed pressing, ejection, die charging, off-bearing, etc. All make use of the new mechanical "brain" device. The standard model 2-C press is equipped for manual operation but can be converted to semi-automatic or completely automatic operation.



BOOKS AND BOOKLETS

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery

"The 1948 Chemical Formulary—Volume VIII."

Published by Chemical Publishing Co., Inc., Dept. 87, 26 Court St., Brooklyn 2, N. Y. Price $7.00. 436 pages

This practical handbook contains formulas for the production of thousands of products in the factory, laboratory, and home. Some of the subjects include adhesives, cosmetics, drug products, food products, ink and allied products, insecticides, leather treating preparations, lubricants and oils, construction materials, paint, varnish, lacquer, and other coatings, paper, photography, plastics, rubber, resins and waxes, polishes, soaps and cleaners, and textiles.

Report on the utilization of Plexiglas in electric signs—The Underwriter's Laboratories, Inc., have prepared this seven-page booklet which gives records of tests covering combustibility, loading, and fragmentation, and presents conclusions reached. *Rohm & Haas Co., Washington Square, Philadelphia 5, Pa.*

Plastics Institute of Australia—transactions 1947—This 75-page booklet presents a series of lectures segregated in four general groups. The first section covers the injection molding of thermoplastics from the engineer's viewpoint; the process is investigated from the physical side. The second section presents thermosetting molding materials, but concentrates on phenol formaldehyde and urea formaldehyde. The third section discusses tool making and the toolroom as applied to compression molding. The last section discusses the history, development, and use of polyethylene. *Plastics Institute of Australia, Wingello House, Angel Place, Sydney, N. S. W., Australia.*

Standards of Hydraulic Institute—The eighth edition of this authoritative 82-page treatise prepared for the pump industry consists of six sections bound together. Section I covers the aims of the Hydraulic Institute. Section II covers centrifugal pumps. Section III presents rotary pumps. Reciprocating pumps is the subject of Section IV. Section V is a general data section. Section VI discusses pipe friction. Information is given on nomenclature, capacities, construction, dimensions, tolerances, safety, operating characteristics, performance, quality, rating, testing, and installation and operation. *The Hydraulic Institute, 90 West St., New York 6, N. Y.*

Plaskon alkyd molding material—The electrical, mechanical, and chemical properties, molding characteristics, and storage of Plaskon alkyd thermosetting molding compound are presented in this four-page bulletin. Also included is a description of the technical services that the company offers to molders and users of the new material and a list of properties of the molding compound. *Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo 6, Ohio.*

Indulin, lignin from pine wood—Typical analyses for Indulin "A" and Indulin "C" are discussed in this 32-page booklet and the solubilities of Indulin in various solvents are listed. Included are uses for Indulin and complete bibliographies on suggested applications. Some of the products and industries covered are: adhesives, absorbents, dispersing agents, electroplating, inks, plastics and laminated boards, resins, tanning materials, varnishes, and wetting agents. *Industrial Chemical Sales, Div. West Virginia Pulp & Paper Co., 230 Park Ave., New York 17, N. Y.*

Self-locking snap nut—This new two-page bulletin describes the new self-locking Prestole snap nut which is simply pressed into position from the work surface. *Prestole Corp., 3171 Bellevue Rd., Toledo 6, Ohio.*

Self-fastening locks—This four-page bulletin illustrates a line of quick-lock, spring-lock, and lock-nut fasteners. The quick-lock fastener, because of installation flexibility, is suited to widely divergent applications throughout all types of manufacturing; the spring-lock, which is made of plastic with a steel insert, is used mainly in the electrical, automotive, railroad, aviation, and household appliance industries; the lock-nut, which is also a stop-nut, finds its application wherever vibration becomes a serious consideration. *The Simmons Fastener Corp., 1750 North Broadway, Albany 1, N. Y.*

The properties and applications of ultramarine blue (Technical Bulletin No. 804)—The early history of the natural color pigment and the introduction of its artificial counterpart are discussed in this technical bulletin. The composition of ultramarine blue, its chemical and physical properties, as well as the theories which have been advanced to account for its blue color are presented. *Calco Chemical Div., American Cyanamid Co., Bound Brook, N. J.*

Artco tools—This 82-page booklet, which holds particular interest to die casters, tool and die makers, engravers, jewelers, and those in related industries, is now available in its 1948 edition. Included are descriptions, illustrations, and specifications of tools for the above mentioned industries. *American Rotory Tools Co., Inc., 44 Whitehall St., New York 4, N. Y.*

L & N electric control, position-adjusting type—Some of the numerous ways that modern automatic controls are helping industrial users to improve operating efficiency are outlined in this new and revised 40-page catalog. It also shows how the P. A. T. system provides complete control action with automatic droop correction obtained through the use of the accurate, reliable balance method both for measurement and control. In addition to the Micromax instruments, the publication also lists the Speedomax line of controllers for applications where unusual sensitivity and speed of response are required. *Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.*

Employment outlook in the plastics products industry (Bulletin No. 929)—This 20-page booklet, prepared by the Occupational Outlook Service of the Bureau of Labor Statistics, gives a brief resume of the plastics industry. The text answers many questions regarding the

A BUYING GUIDE FOR ABRASIVES

ABRASIVE PROBLEM:
How can proper selection and application be assured?

ANSWER BY

CARBORUNDUM
TRADE MARK

To realize maximum efficiency from even the highest quality abrasives, it is essential that attention be directed to their correct use. For this specific purpose, The Carborundum Company has established a specialized group of product application engineers.

This group studies, appraises and tabulates abrasive applications. New improved methods and better abrasive products are often turned up by them. CARBORUNDUM engineers are also called in to help in selecting the best abrasives to use for specific jobs and in specifying their application. The end result is better grinding, sanding and finishing at lower overall cost... another reason pointed to in preferring abrasives by CARBORUNDUM. The Carborundum Company, Niagara Falls, New York.

A Good Rule for Good Grinding...CALL IN

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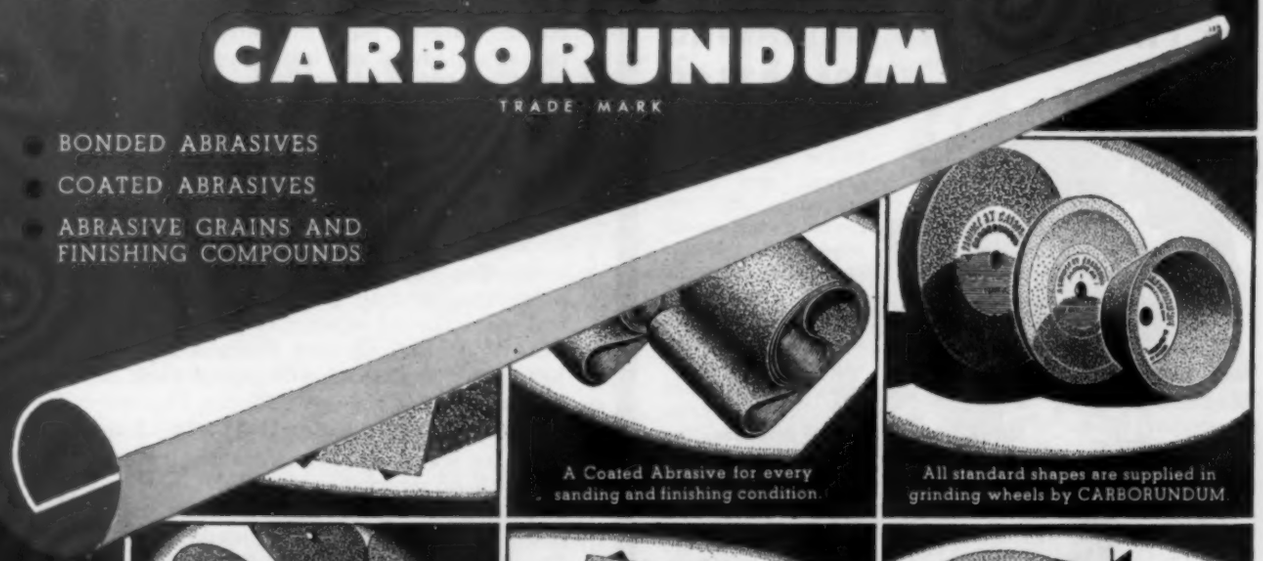
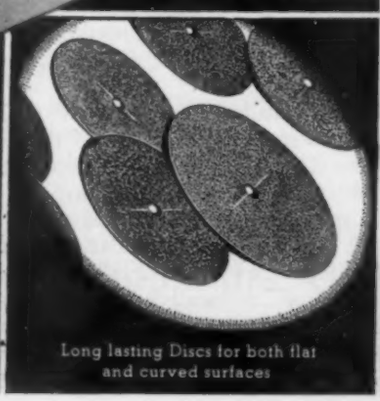
- BONDED ABRASIVES
- COATED ABRASIVES
- ABRASIVE GRAINS AND FINISHING COMPOUNDS



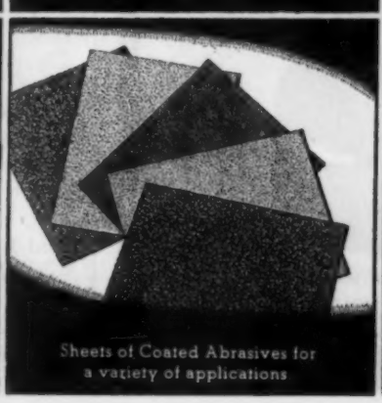
A Coated Abrasive for every sanding and finishing condition.

All standard shapes are supplied in grinding wheels by CARBORUNDUM.

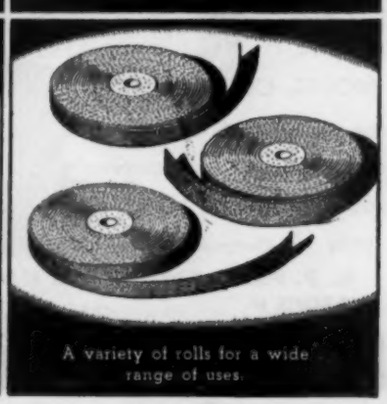
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company.



Long lasting Discs for both flat and curved surfaces



Sheets of Coated Abrasives for a variety of applications



A variety of rolls for a wide range of uses.

scope of the industry, jobs in the plastics products industry, the outlook for employment as reflected by past trends in production and employment, training opportunities for new workers, output of plastics products from 1931 to 1945, estimated employment in the plastics products industry from 1937 to 1946, etc. *U. S. Department of Labor, Bureau of Labor Statistics, Washington 25, D. C.*

Santicizer 141 . . . the safe plasticizer—The advantages of polyvinyl chloride plasticized with Santicizer 141 over ordinary polyvinyl chloride are discussed in this 12-page booklet. Presented also are charts on flame-out time for plasticized polyvinyl chloride film, Shore durometer hardness tests, abrasion resistance, low temperature flexibility, etc. *Organic Chemicals Div., Monsanto Chemical Co., St. Louis 4, Mo.*

Federal government purchasing offices—Listing 104 federal government purchasing offices, this directory is classified according to the armed services and other federal purchasing agencies, with names and addresses of personnel to be addressed. The directory also lists five publications which the government has prepared for the guidance of vendors. The *Chicago Association of Commerce and Industry, Chicago, Ill.*

Farrel centennial—To commemorate the 100th anniversary of the founding of its plant, this company has released a 32-page centennial booklet presenting a historical resume of the company and descriptions of its present-day work and products. *The Farrel-Birmingham Co., Inc., Ansonia, Conn.*

Injection molding machines—A detailed description of H-P-M injection molding machines and how they operate is presented in this new two-color folder. In addition to operating data, a page is devoted to data of special value to production men—the function of the mold clamp, material feed, injection unit, heating chamber, movable die head, and operating system. Complete specifications of H-P-M 4, 9, 16, and 40 oz. capacity units are listed in chart form. *The Hydraulic Press Mfg. Co., Mount Gilead, Ohio.*

A simplified guide to Bakelite and Vinylite plastics—Information is presented in this 24-page, two-color booklet on phenolics, ureas, vinyls, and polytyrenes, laminating varnishes, cast resins, resins for coatings, resin adhesives, bonding materials, impregnating and sealing materials, special copolymer products, elastomeric plastics, rigid sheeting, and fibers and yarns. *The Bakelite Corp., 30 East 42nd St., New York 17, N. Y.*

How to use Carbo-Kote (M-2)—This four-page bulletin describes a corrosion resistant coating and explains how to put it on wood, how to mix it, how to clean brushes after the coating has been applied, and what temperatures are required during application. *The Carboline Co., 502 N. Taylor St., St. Louis 8, Mo.*

G-E plastics (Bulletin No. CDP-578)—The design, mold making, and molding facilities of the company are discussed in this illustrated 15-page bulletin. In addition, the booklet describes G-E molded and laminated plastics, sealing caps and sleeves, Mycalex, silicone rubber, and 1422 high frequency insulation. High and low pressure laminates are summarized along with G-E silent gears, bearings, decorative surfaces, translucent sheets, and name plate materials. Property tables are included for reference. *Chemical Dept., General Electric Co., Pittsfield, Mass.*

(Please turn to next page)

Weldwood plywood—Twenty-seven ways to finish Weldwood plywood panels are described in a brochure just issued by the *United States Plywood Corp., 55 West 44 St., New York 18, N. Y.*

Marking machines—A two-color folder describes how to mark plastics, wood, fiber, hard rubber, cloth, board, paper, and leather by the roll leaf process. The marking machines used are illustrated and specifications are listed. *The Peerless Roll Leaf Co., Inc., 4511 New York Ave., Union City, N. J.*

How to cut corrosion costs—Illustrated case histories in this four-page folder tell how the company's coatings cut painting maintenance costs by providing machinery, equipment, walls, and floors with effective protection against corrosion from acids, alkalies, oil, and water. *Prufcoat Laboratories, Inc., 63 Main St., Cambridge 42, Mass.*

Synthetic organic chemicals (Bulletin C-8-103)—Listing all products offered by Koppers, this bulletin includes a number of new products introduced this year and presents the structural formula of each together with brief information on its properties, uses, and reactions. *Chemical Div., Koppers Co., Inc., Koppers Bldg., Pittsburgh 19, Pa.*

Synthetic resins & plastics (Bulletin No. 23)—New processes, innovations, and discoveries regarding the manufacture of synthetic resins and plastics in Germany are offered in translations of research records, patent applications, and directions for production from the files of I. G. Farben, Degussa, Rohm & Haas, and other large German plants. *Research Information Service, 509 Fifth Ave., New York 17, N. Y.*

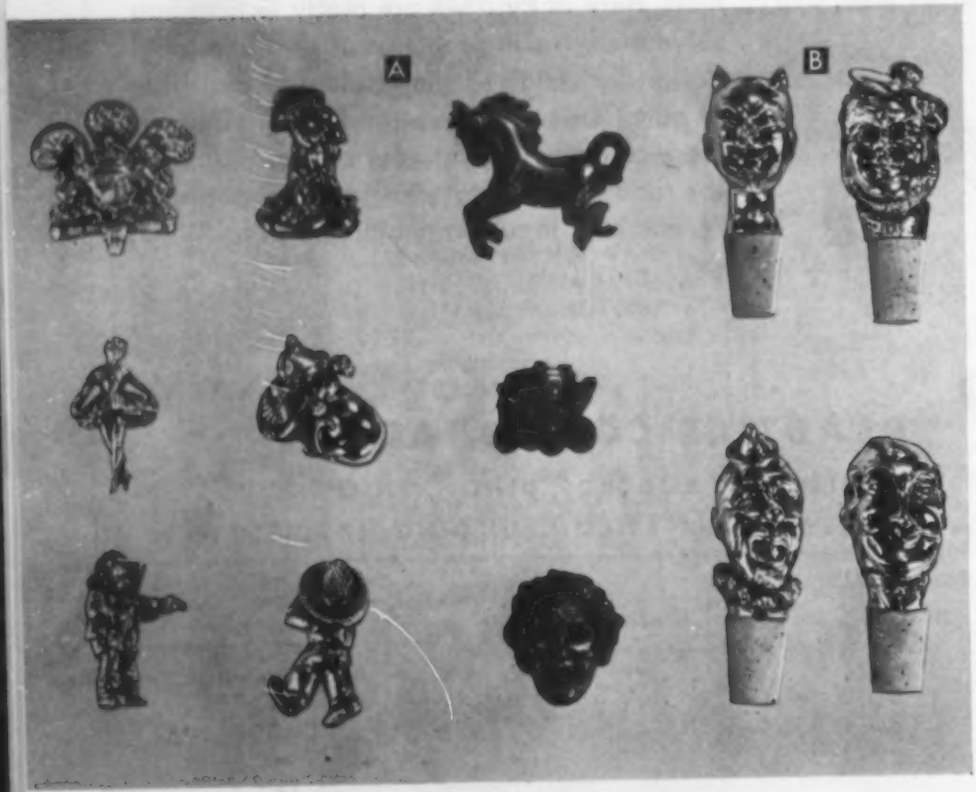
Di-tert - butyl - meta - cresol (Bulletin C-8-114)—This eight-page bulletin describes the properties, uses, and chemical reactions of Di-tert-butyl-meta-cresol—the alkylated tar acid. The bulletin includes technical information relative to the properties of the product, commercial information as to containers and handling conditions, and a discussion of its uses and chemical reactions. *Chemical Div., Koppers Co., Inc., Pittsburgh 19, Pa.*

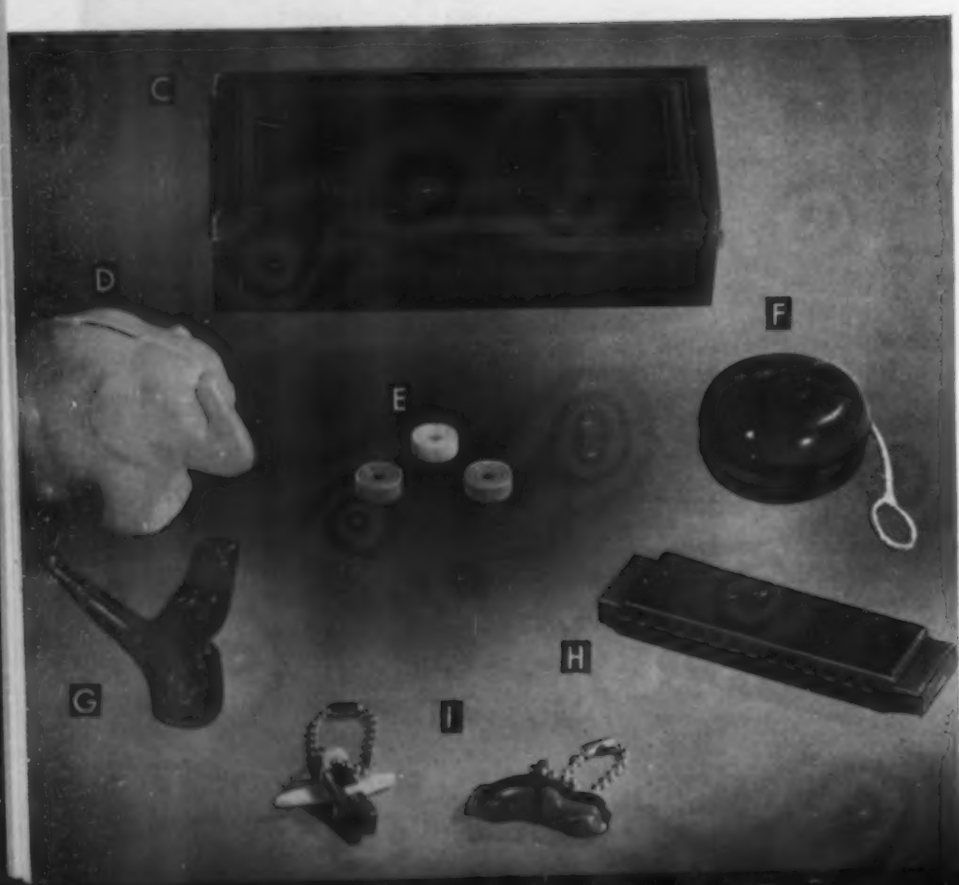
The best of everything for metallizing—Metallizing equipment and supplies are described in this six-page booklet. Included are metallizing guns for every purpose, air and gas controls, spray booths and dust collectors, blast machines and nozzles, and air compressors. Introduced in the booklet are three new accessories: 1) a wire control and straightener unit to increase spraying speeds; 2) a gas flow meter unit, reported to be the first of its kind, to assure maximum efficiency, higher spraying speeds, and greater gas savings, and 3) an air control unit that assures the user of properly controlled air pressures. *Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City, 1, N. Y.*

Di-acro system of die-less duplicating—This 40-page booklet discusses the process for duplicating parts or pieces to die accuracy without time delay or expense of dies, by using the Di-acro machines individually and in cooperation with each other as die substitutes. Some of the Di-acro precision machines include rod parters, benders, bender conversions, shears, notchers, punches, brakes and radius brakes. Described in this illustrated booklet are the engineering services offered by the company. *O'Neil-Irwin Mfg. Co., Lake City, Minn.*

PLASTICS STOCK MOLDS*

DECEMBER 1948





A—Character pins and ornaments, available in many assorted styles and sizes. These pins may be purchased with or without the metal plating. Phenolic. With a silver-oxidized or antique-gold finish.

B—Set of four bottle tops. An elephant and a donkey have been added to this line of bottle tops. Phenolic. Silver-oxidized or antique-gold plated finishes.

A and B manufactured by Lenward Products, Div., of Alvin-Lenward, Inc., 331-333 E. 26th St., New York 10, N. Y.

C—Cigarette, jewelry, or general utility box with telescoping lid. Inside dimensions, 6⅞ by 2⅞ by 1 13/16 inches. Weight 3.39 ounces. Polystyrene. Bases are red or black with a clear transparent lid. Smoking Pipes Incorporated, 36 Morton St., Paterson 3, N. J.

D—Elephant bank, 4 by 2½ inches. Weight 8 lb. per gross. Polystyrene. Assorted popular colors. Jericho Toy Mfg. Corp., 2 East 23rd St., N. Y. 10, N. Y.

E—Birthday candle holders which set on top of the icing and do little damage to frosting when withdrawn. Diameter ⅝ in., ¼ in. high, weight approximately 1 gram. Melamine. Molded in a seven-cavity mold. White, pink, blue, red, yellow, or other standard colors. Suburban Plastics Co., 39 W. Chicago, Roselle, Ill.

F—Tournament top, approximately 2 in. diameter, weight 8½ lb. per gross. Cellulose acetate. Popular assortment of colors.

G—Singing canary whistle with loud clear trilling tone when filled with water. Weight 3 lb. per gross. Polystyrene. Assorted colors.

H—Child's harmonica containing 13 reeds, approximately 4¼ in. long and 1 in. wide. Weight 8 lb. per gross. Polystyrene. Two tone, assorted colors.

I—Airplane and car puzzle novelty key chains. Acetate. Two-tone, assorted colors.

F to I inclusive manufactured by Jericho Toy Mfg. Corp., 2 East 23rd St., New York 10, N. Y.

Molders are invited to submit samples of stock products to be described on this page as space permits. Address samples and detail information to Stock Molds Editor, Modern Plastics, 122 E. 42nd St., New York 17, N. Y.

*Reg. U. S. Patent Office.

Plastic electric light bulb sockets, molded of brown phenolic or ivory urea, use 25% fewer parts than brass sockets

All-Plastic Sockets

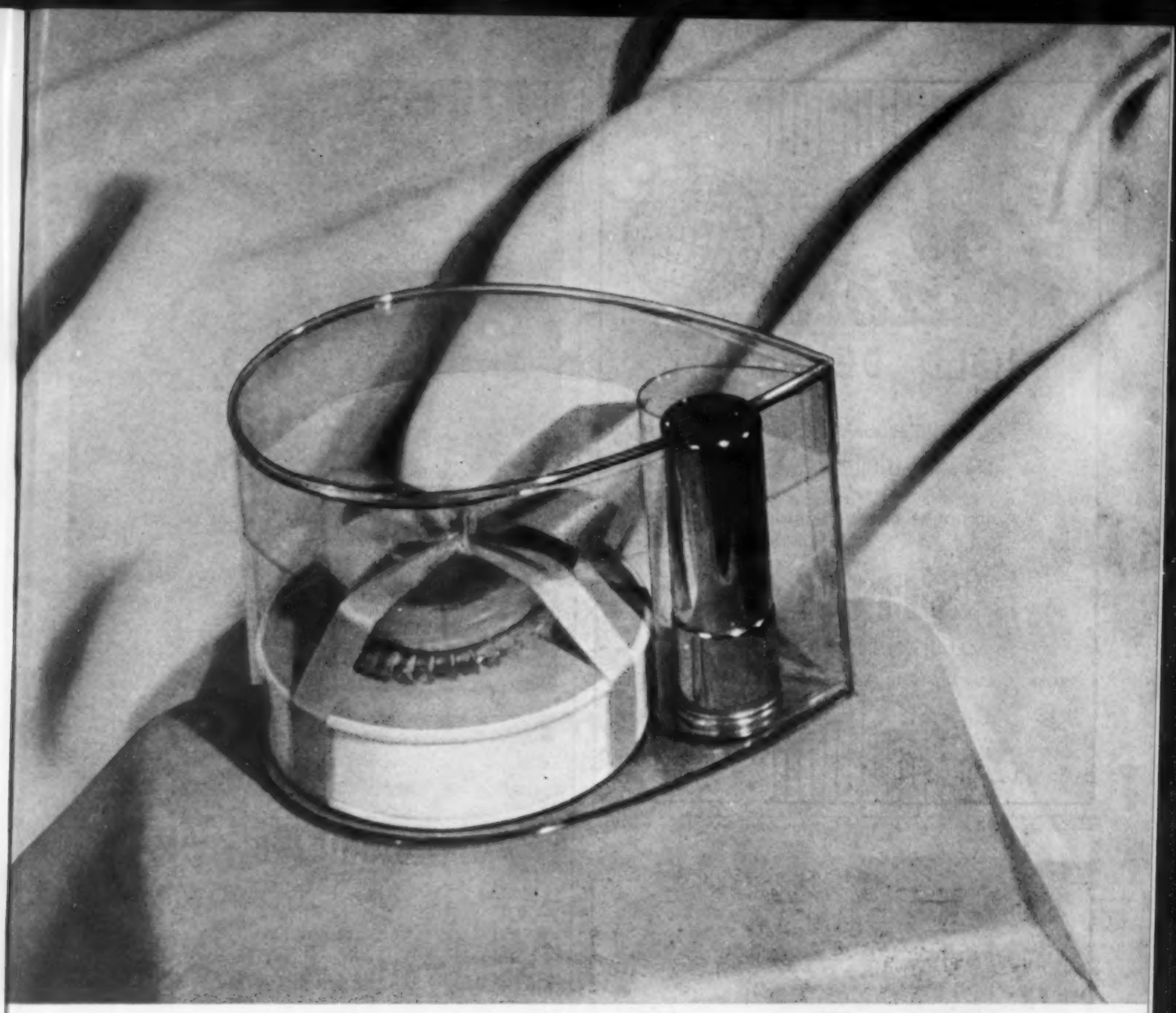
THE brass shell socket for electric light bulbs that was developed back in Grandfather's day has a vigorous competitor on the American market. The brass shell, which requires a paper or other lining because it is a conductor, is completely missing in a new all-plastic socket that possesses high dielectric properties.

The all-plastic sockets, which are manufactured by the Monowatt Electric Corp., Providence, R. I., are molded of brown phenolic or ivory urea. The cap and body of each two-piece socket are molded of the same material.

The new plastic socket has a locking cap which, it is reported, can not be pulled off once the cap is locked simply by turning the cap into place. Every unit can be wired as a pendant, threaded nozzle, or side outlet socket. Connection screws are conveniently located underneath the cap to make the job of wiring comparatively easy.

The thermosetting plastic socket represents the end result of some 10 years of work. The original idea, conceived in 1936, went through four years of design and redesign before it was accepted. Work on the socket was suspended during the war. After the war the design was reworked, further improvements made, and the socket was put into production.

From an engineering standpoint, the present socket represents considerable improvement over the brass type. The new socket uses 25% fewer parts and is tamper proof inasmuch as the mechanism is completely sealed by two blind-drive pins.



For products that sell on sight...

● Merchandise quickly becomes self-selling in attractive display cases of Kodapak Sheet.

For this amazingly clear and sparkling plastic packaging material shows off all the product's beauty to its best advantage . . . keeps it clean and fresh-looking . . . helps make shopping easier, selection faster.

Kodapak Sheet is made in two basic forms: Kodapak I Sheet, cellulose acetate, in gauges up to 20 thousandths (0.020″). Kodapak II Sheet, cellulose acetate butyrate, in gauges up to No. 200 (0.00200″).

To learn more about this packaging material, the Kodapak Demonstration Laboratory in Rochester is available to demonstrate fabrication possibilities and practical end uses.

Cellulose Products Division
Eastman Kodak Co., Rochester 4, N. Y.

FOR THE DISPLAY YOU WANT . . . THE PROTECTION YOU NEED . . .

Kodapak Sheet

"Kodapak" is a trade-mark

Kodak

Nursery rhyme book, made of all-vinyl, has three characters of double page thickness that can be cut out and blown up

Inflatable Cut-outs

A FAR cry from grandma's day is this all-vinyl nursery rhyme book whose characters can be cut out and blown up to delight the modern youngster. Three verses are presented in the book shown above —"Hickory Dickory Dock", "Pussy-cat Pussy-cat", and "This Little Pig".

Manufactured by Plastite, Inc., New York, N. Y. from white Vinylite sheets, each book requires a strip 16 in. high by 36 in. long for a page size of 8 by 9 inches. This gives six pages of double thickness which form the three inflatables, plus the covers. First the lettering and designs are hand screened on the sheet in red and blue. Extruded red vinyl valves, followed by white washer flaps, are next electronically welded to the backs of the three figures. Their fronts and backs are then aligned and sealed together around the edges. Another heat sealing operation joins the pages and cover.

Wide red dashes about ¼ in. from the sealed outlines of the figures direct the child's cutting and prevent him from going too close to the seam.

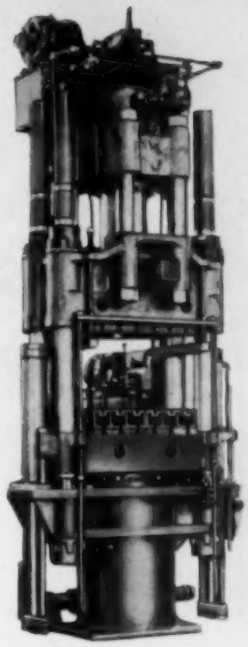
Plastite has also marketed a fable book and another for the Christmas trade presenting the poem, "The Night Before Christmas" with an inflatable Santa, circular reindeer scene, and holiday tree.

What has the Price of Meat to do with WILLIAMS-WHITE Presses?

Prices of meat and other foods are computed accurately on these gleaming white scales, shown at left. The beautiful Plaskon cover parts are molded on WILLIAMS-WHITE presses by the General American Transportation Co., for the TOLEDO Scale Co.

WILLIAMS-WHITE & CO. bring to the solution of your production problems years of experience in the design and construction of machines to individual specifications.

Write, giving as much information as possible about the machine you need and WILLIAMS-WHITE & CO. will send complete specifications at no obligation to you.



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Junior Juke Box

IN a highly competitive market, such as the automatic phonograph market, the product must have at least one outstanding selling point in order to motivate buying interest into buying action. In the Junior Juke box, manufactured by the Ideal Novelty and Toy Co., Jamaica, L. I., N. Y., for the Lindstrom Corp., Bridgeport, Conn., the selling attraction is the phonograph's array of colorfulness. The front of the juke box is of red and yellow plastic. When the machine is operating, flickering lights illuminate the front panel; two small, red light bulbs, located on either side of the opening, illuminate the opening for record insertion.

Polystyrene final choice

Polystyrene was chosen as the molding material for the front and framework of the 15½-in. wide by 16½-in. high miniature juke box because of the material's low cost and good moldability. The unit, which is a project of the Bing Crosby Research Foundation, takes records of all sizes—from 12-in. platters down to miniature size children's records. The juke box operates on AC-DC, and incorporates a two-tube amplifier.

Molding details

The decorated grill, the U-shaped strip, and the framework are all molded in single-cavity, center-gated dies and are produced on a 22-oz. injection molding machine. The polystyrene scroll is molded in a four-cavity mold and is then hot stamped for the lettering which identifies the juke box as a project of the Crosby Foundation. The off-on-volume knob is supplied by Lindstrom. A coil winding spool used in the instrument is made of nylon and is injection molded in a 10-cavity die.

The front of the miniature-size juke box is made of polystyrene. The coil winding spool, shown in foreground, is nylon

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Phenolic radio cabinet is shown at top with removable phenolic ash tray in foreground. At the right is shown assembled unit

Smoker's Radio

WHEN the man of the house sits down to listen to his favorite radio program, chances are that he will also reach for a cigar, cigarette, or his favorite pipe. This logical association of activities inspired Porto-Products, Inc., Chicago, Ill., to develop its new combination Smokerette-Radio, which is housed in a rich dark walnut or mahogany finish phenolic cabinet molded by Chicago Products Corp. Chicago.

The Smokerette-Radio is a companion piece to the Porto-Bar and Porto-Baradio brought out earlier by the same company. The new unit contains a Stewart-Warner AC-DC radio and a complete set of smoking accessories, including two large humidors for cigars and tobacco and a double cigarette box.

Although the cabinet is interesting from the standpoint of size, measuring 21¼ in. in over-all length, with a depth of 12 in. and height of 8 in., its chief significance from the production angle is that in a single molding operation the manufacturer is able to obtain a complete unit with four pipe rest slots, receptables for the humidors and cigarette box, and openings at top and front in the left side of the cabinet for an ashtray and the radio set panel. The cabinet, including the removable phenolic ash-tray which fits into it just above the radio, weighs just under 7 pounds.

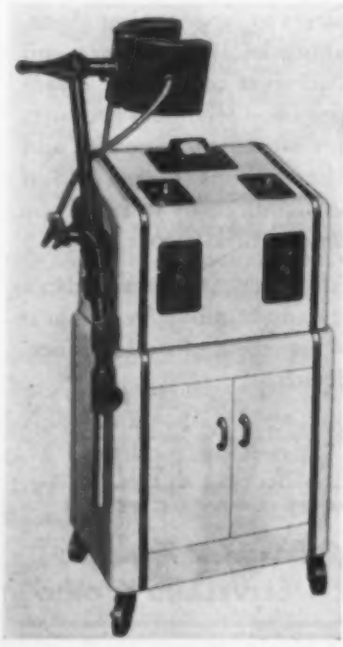
The Lucite radio grille and polystyrene covers for the smoking set are molded by Elmer E. Mills Corp., Chicago, and trimmed in gold.

Phenolics in

SHORT wave electro-medical treatments require special equipment with production emphasis on parts possessing good electrical properties. Thus, seven different types of phenolic are used to form the plastic parts in a new frequency-controlled diathermy unit, Model SW-227, said to provide for every accepted method of diathermy application, which has recently been put on the market by the Liebel-Flarsheim Co., Cincinnati, Ohio. Each phenolic was selected on the basis of its particular properties and the job which it was required to do. The exterior phenolic components of this unit, indicated on the photograph reproduced on the opposite page, are as follows:

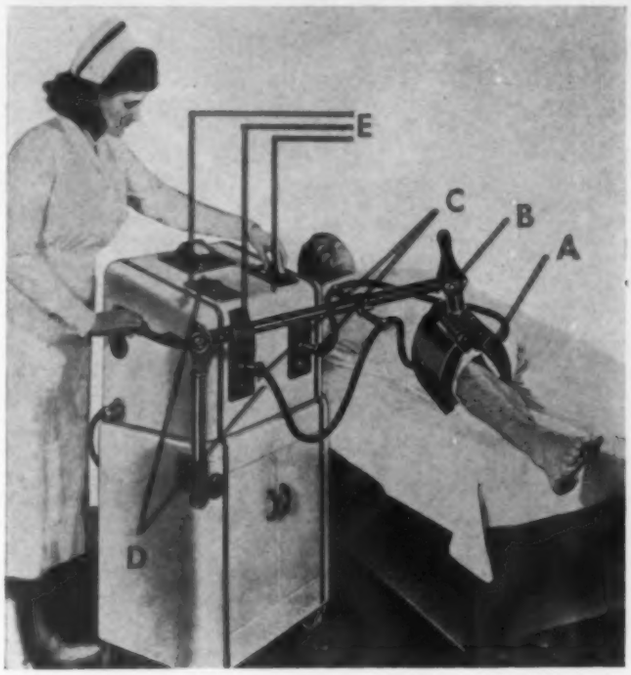
(A) In the hinged treatment drum which can be adjusted to fit almost any contour, the two-piece front plate, the two-piece back plate and the center plate are compression molded from Durez 1900. This phenolic was selected because it gives an excellent surface finish and is more rigid at discharge than most impact materials, thereby making it easier to hold the irregular shape of the drum. The center plate back is molded of Durez 2271 because of this phenolic's ability to withstand some flexing without cracking.

(B) The adjustable arm for the drum has a tube fabricated from XX phenolic, a laminated paper base material, and an adaptor molded of Durez 2271. The latter was again chosen because of its ability to take flexing and its good surface finish. The XX phenolic was used because of its good electrical characteristics, finish, and strength.



Frequency - controlled diathermy unit has 18 phenolic parts, including treatment drum, adjustable arm, push buttons, and control plates

Diathermy Unit



Patient receives treatment with new unit. The labelled phenolic parts are named and described in detail in text

(C) Bakelite 1895's low loss factor explains its selection for the left and right terminal boards.

(D) A great amount of machining was necessary to produce the drum leads and meter mounting. If a regular general purpose phenolic had been employed, wood flour specks might have marred their appearance. Durez 114 was therefore used.

(E) Durez 791, possessing better than average electrical properties, was chosen for the left and right control plates, the push button, and meter plate.

Five plastic parts inside the unit are a terminal board, a terminal board meter resistor, a rotor crank, a top condenser molding, and a bottom condenser molding. The terminal board and resistor are fabricated from XX phenolic. Bakelite 1895 is used for the rotor crank because of its low loss factor. A similar phenolic, Durez 11863, was employed for the top and bottom condenser moldings because of its low loss qualities.

The Plastic Moldings Corp. and Cincinnati Molding Co., both of Cincinnati, Ohio, are molding or fabricating these parts.

Among the features of the diathermy unit are a Protect-A-Tube device making it impossible to overload the circuit, a frequency channel monitor, voltage compensator, informative metering, and various sized outlet terminals to accommodate each type of applicator.

Formed acrylic panel incorporates all instruments, switches, and trouble lights in one unit that can be seen at a glance

Bus Instrument Panel

FOR its ultra-modern new two-level, 50-passenger bus, Greyhound Corp. wanted an instrument panel which would provide quick legibility in a compact area below the steering wheel. Other requirements were that the panel have adequate, comfortable illumination and that it be designed as a unit for quick assembly and installation.

Working under the supervision of and in cooperation with the Greyhound engineering department, George Francis Miller, Chicago industrial designer, developed a panel which combined these and other desirable features. The prototype unit has as its principal element a formed and engraved cover of ¼-in. Plexiglas. Later covers may be either drawn from sheet material or injection molded, as production requirements dictate.

Measuring 23 by 9½ in. over-all, the formed acrylic panel incorporates all instruments, switches, and trouble warning lights in a single unit, affording accurate reading at a glance through the combined application of illumination and color. Top surface of the panel is dyed light green, with calibrations and nomenclature, engraved on the underside, filled-in in a cream color. Use of this cover with a dark green aluminum escutcheon plate beneath it provides a combination that is easily read by night or day.

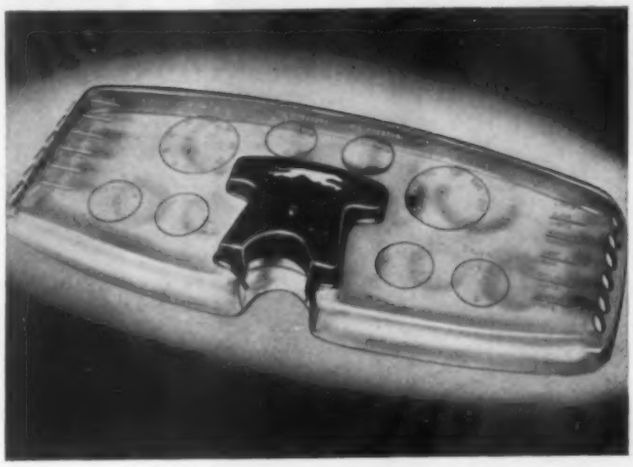
Nomenclature engraved in the plastic panel is

edge-lighted uniformly by means of two bulbs beneath a formed Plexiglas light cover mounted in the center of the panel, the illumination of the various instrument pointers being made possible by recesses machined in the back of the panel over each instrument. The cover of the light, dyed dark green on the underside, carries the familiar Greyhound leaping dog etched on the inner surface and filled with a grey enamel.

Controlled illumination

Intensity of panel illumination may be adjusted to the driver's individual requirements through a hand controlled rheostat. Six control switches of the toggle variety are grouped at each end of the plastic panel. Nomenclature for these switches is also engraved on the underside of the acrylic cover and the "on" and "off" position for each is clearly indicated by small bulbs located beneath round openings in the aluminum escutcheon plate.

Engraved nomenclature on acrylic panel is edge-lighted uniformly by means of two bulbs located beneath plastic cover



Individual covers not necessary

The fact that the formed plastic panel provides calibrations and nomenclature for all the instruments eliminates the need for individual instrument covers and bezels. The Plexiglas cover is anchored to the cast aluminum housing by means of an aluminum molding strip, a rubber gasket guarding against entry of dust. Because of its unique construction, the entire panel may be easily assembled as a unit. By using a single multiple connector, the complete panel may be disconnected and easily removed for quick inspection or servicing.

Drawing of the Plexiglas panel was handled by Paramount Plastics Co., Inc., Chicago, Ill., with panel machine work by Colonial Kolonite Co., Chicago. Rite Engraving Co., Chicago, performed the engraving of the dial calibrations and panel nomenclature.

Television Lamp

WITH the growing popularity of television in the home, the need for a new type of lamp has arisen. Conventional incandescent lighting sometimes interferes with clarity of vision but some type of light is needed to allow the viewer to move about without fumbling or stumbling.

Videolite, a decorative table model lamp with a dual-purpose lighting unit, has been developed by Polyplastex United, Inc., New York, N. Y., and Lampcraft Studios, New York, N. Y., for use with home television sets. The attractive decorator-type bases, manufactured by Lampcraft, have two built-in circuits—one for a regular reading light and the other to provide black light.

This black light causes fluorescent pigments in the shade to glow and create a mellow atmosphere which does not detract from the video screen. Polyplastex fabricates the shades from its own sheet material which is composed of Fiberglas impregnated with a Vinylite plastic resin. Fluorescent pigments are applied in colorful patterns to this material.

Grading of Plastics

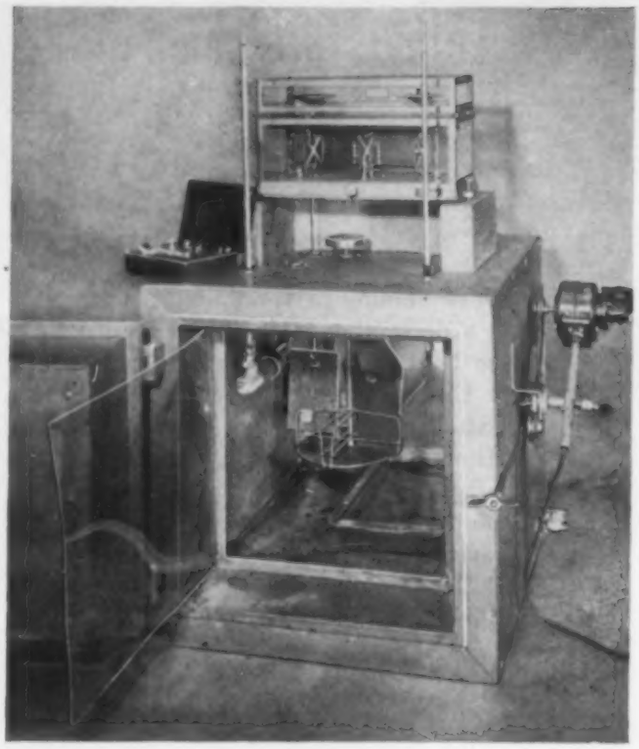
(*Continued from page* 127)

rotating, lowering, etc. The cellulose acetate inner door enabled the inside of the chamber to be viewed without changing the conditions of humidity and temperature. The torsion balance (Torsion Balance Co., style 296) was sensitive to less than 0.005 g. The rod from the balance held the sample by means of a small hook attached to the end. A metal baffle was placed between the sample and the heater bulb to protect the sample from direct radiation. The thermometers were also individually shielded from direct radiation.

Figure 2 shows the apparatus used to measure insulation resistance of the specimens. For taking the insulation resistance measurements, a megohm bridge (General Radio Company, type 544-B) was used. The leads into the humidity cabinet were made with Kovar-to-glass seals, the glass being insulated from the metal of the cabinet by stoppers made from polytetrafluoroethylene. The glass was also coated with a Dow Corning #7 grease to eliminate surface leakage.

Test procedures

All specimens were cut to 3 by 4 in. and the edges sanded. (On the thinner specimens the samples measured 3 by 6 in. so as to reduce the percentage of error involved in weighing.) On specimens used for measuring insulation resistance, two holes were



2 — Apparatus used to make insulation resistance measurements

drilled and tapped on the long center line; screws were inserted and tightened with nuts on either side of the sheet.[2] The distance between these electrodes was 1¼ in. on all specimens. All samples were cleaned with petroleum ether and conditioned for 24 hr. at 50° C. in convection oven.

The conditioned samples were placed in the humidity chamber immediately upon removal from the conditioning oven to prevent cooling to room temperature, which would cause condensation on the sample when placed in 97% relative humidity at 30° C. The samples were weighed as rapidly as possible (previous weighings before conditioning expedited rapid weighing of the samples) and the clock time noted. Readings were made of clock time, dry and wet bulb temperature, and the weight of the sample, for a period of at least 24 hr. on each specimen. The method was reproducible within the experimental error involved in weighing the samples. For some specimens, water immersion tests were run for comparison with the data obtained when using the humidity chamber. All calculations for moisture absorption were made on the conditioned basis.

The insulation resistance measurements were made on each sample until nearly constant values were obtained. The voltage was applied across the samples only momentarily for each measurement of the insulation resistance. The leads into the chamber were checked at intervals to insure that they

[2] A.S.T.M. D 257-45.

Section of the 10,000 square feet of floor space devoted to our laboratories. Twelve full-time chemists and technicians carry on a program of pure research, industrial application and product quality control.

How to get help on plastic material selection

Select a molder with a research program and laboratory facilities like these . . .

Our engineers are wedded to no particular material. Their lab program ranges from natural rubber to the latest development in plastics or synthetic rubber. Backed by over 60 years of molding experience and their current three-fold program of pure research, product application and quality control, they are always in a good position to help you choose the best material for your product and to suggest new and better materials as they are developed in our laboratories or by suppliers. And when a problem of price or supply exists, they can help you find the material and method to suit the situation.

If you are planning on using large quantities of a molded part or product, send us your blueprints and specifications for quotation. Not only can we turn out the best that can be made today, but with our experience, plus up-to-date laboratory research and control, we can improve your chances for a better product tomorrow.

Our laboratories include this pilot plant containing duplicates of our production equipment. In it, our engineers carry on a program of continual research to improve molding methods, and materials are tested for behavior under operating conditions.

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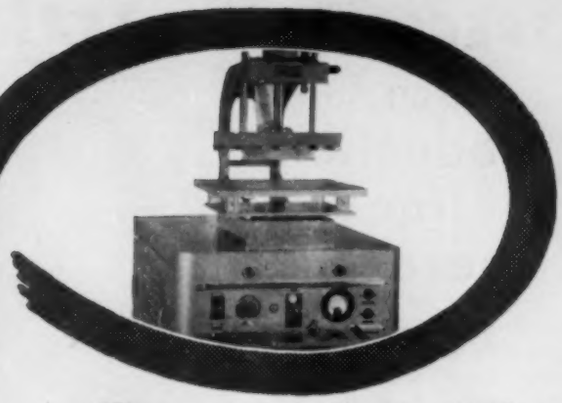

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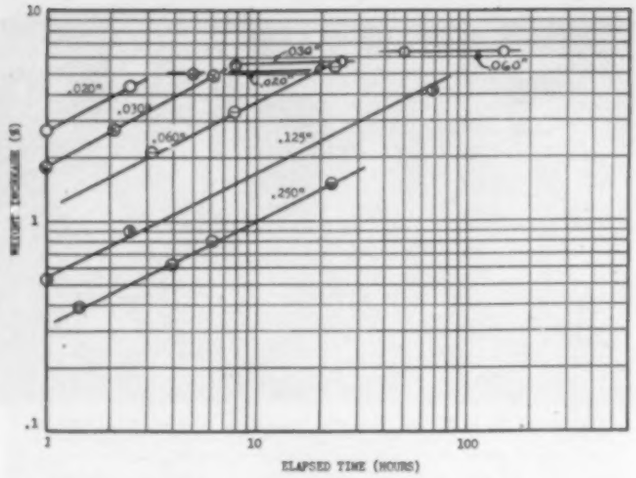


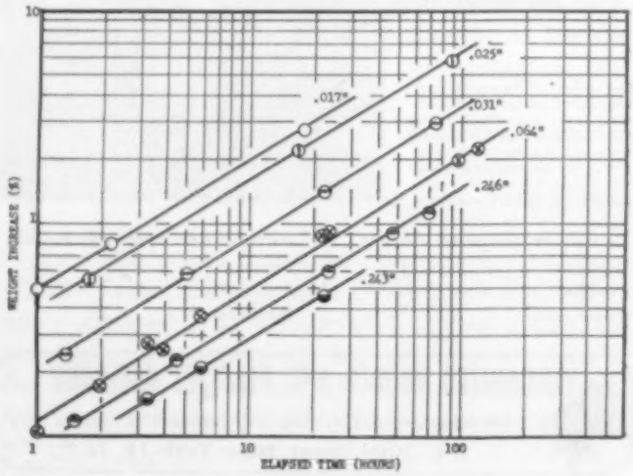
3 — Moisture absorption as a function of time for samples of cellulose acetate sheet of various thicknesses

were properly insulated. After more than 4000 hr. of operation the insulation resistance between the leads and ground was still greater than 100,000 megohms.

Discussion of moisture absorption

The method utilized here enabled the continuous measurement of the rate and amount of moisture absorption to be made without the removal of the sample from the chamber. This feature proved to be of particular value in the testing of the thinner specimens. Many materials of thin sheet will reach equilibrium in water immersion tests long before 24 hr., necessitating intermittent weighings. The wiping of excess water from the sample and the rapid evaporation while weighing contribute to serious error on thin specimens. The weighing errors are greatly minimized when the samples are tested by the present method and a rapid grading of sheet plastics may be obtained. Two or three readings over a period of 2 or 3 hr. are sufficient to determine

4 — Moisture absorption as a function of time for laminated paper-base phenolic (Grade XP) samples of various thicknesses



A Big Step Forward!

ALL-METAL CHROMALOX *Electric* RADIANT HEATERS

A New Infrared Heat Source

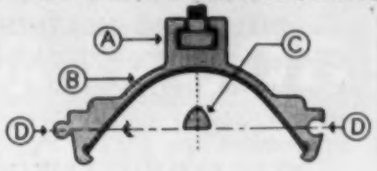
Now—You can use infrared heat in many applications where it has not been entirely practical before. That's because the new, all-metal CHROMALOX Radiant Heaters withstand shock, vibration, dust and moisture . . . they provide glareless infrared radiation in wave lengths which are absorbed almost equally well by all colors, textures and surfaces . . . they operate efficiently in high and low ambient temperatures.

FLEXIBLE IN APPLICATION—CHROMALOX Radiant Heaters are used for infrared drying, preheating, baking, curing, mass-heating, skin-drying, dehydrating and similar applications. Tongued-and-grooved sides facilitate fabrication of heater sections into various working patterns such as banks, tunnels, ovens, etc.

HIGH IN EFFICIENCY—The heat source is an efficient Inconel-sheathed CHROMALOX Tubular element which operates at temperatures of 1000° to 1400° F. It produces uniform and even heat without hot-spots and with a negligible amount of incandescent light. "Alzaked" aluminum reflector sheet gives maximum radiation.

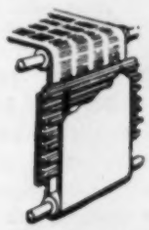
GLASSLESS, ALL-METAL CONSTRUCTION—Extruded aluminum body and shock-proof heating element withstand rough usage; dangers of glass breakage are eliminated. Compact size—4" depth with lengths of 25", 31" and 47". Units come complete with adjustable mounting bolts, ready to install.

QUICK, LOW COST INSTALLATION EFFICIENT, DEPENDABLE SERVICE

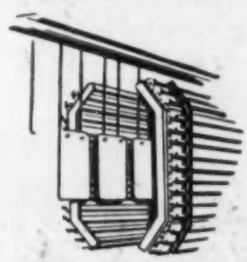


A. Two adjustable captive-bolts per section permit quick and easy mounting into desired position.
B. Extruded aluminum body is equipped with a highly polished, non-oxidizing parabolic reflector for maximum reflectivity.
C. Heat source is high temperature Chromalox triangular-shaped element located to give efficient direct and reflected radiation.
D. Units can be quickly interlocked lengthwise to form straight lines and circular or oval banks of any desired width.

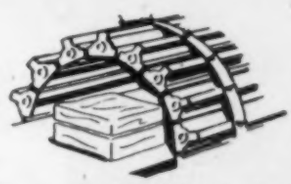
TYPICAL APPLICATIONS:



Single-banks of Chromalox Heaters, mounted in line, bring the efficiency of infrared heat to applications where it was not practical heretofore because of space limitations.



Easily formed, double-banks of Chromalox Radiant Heaters are ideal for line-production. Infrared rays are radiated directly and uniformly on materials being processed.



Sections may be interlocked to form tunnels over conveyor belts; units operate with equal efficiency from all angles. Their glassless construction permits their use in processes and assembly lines which formerly avoided infrared heat because of the hazards of open flames or glass breakage and contamination.

CHROMALOX

Electric Heat for Modern Industry

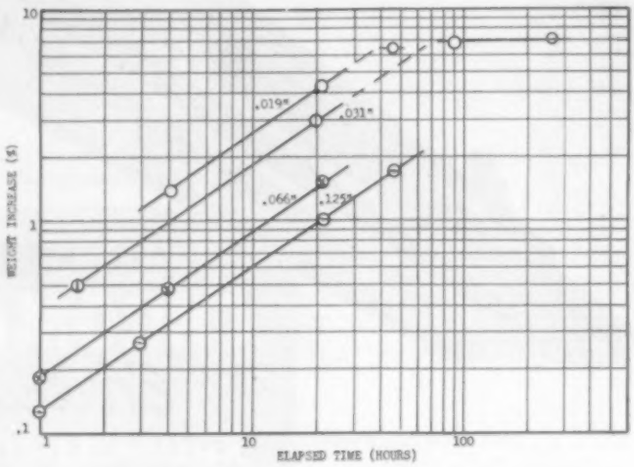
Write for Free Bulletin CS-603

It contains complete information and specifications on the all-metal Chromalox Electric Radiant Heaters and shows how you can use these units in your present or projected infrared applications.

EDWIN L. WIEGAND CO. · 7503 THOMAS BLVD., PITTSBURGH 8, PA.

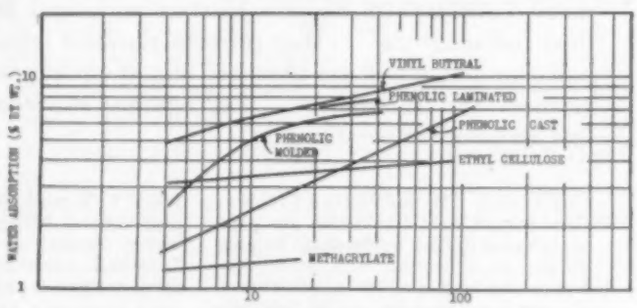
1C-40

the straight line on the log-log plot. This saves considerable time over the 24-hr water immersion method, since the equivalent 24-hr. absorption can be predicted after making the first few readings, assuming, of course, that the equilibrium value for the particular sample is known to be greater than the computed 24-hr. value. The humidity chamber method for measuring moisture absorption eliminates the effect of water-soluble material in the



5 — Moisture absorption as a function of time for laminated paper-base phenolic (Grade XXX) samples of various thicknesses

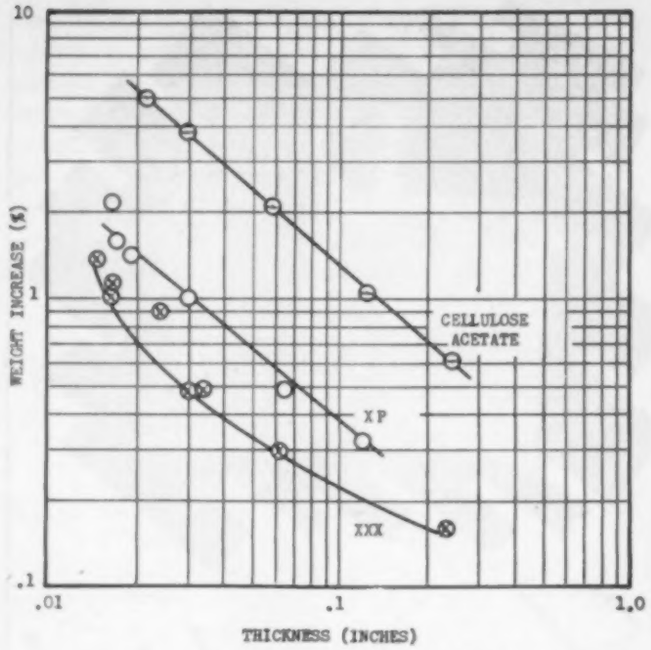
6 — Sorption by various plastics (approximately ⅛ in. thick) upon water immersion at 25° C. Plotted from data of Kline, Martin, and Crouse



sample, while at the same time allowing temperature and vapor pressure control.

The results obtained herein indicate that the mechanism of absorption for sheet materials is such that a straight-line relationship exists on a log-log plot when the % moisture absorption is plotted against time, provided that the sheet area is large in comparison with the edge area. This relationship, of course, ceases as saturation is approached. This same relationship was found to exist by Taylor[3] who reported the results of work on phenol plastic and soft vulcanized rubber when immersed in water. The straight-line relationship (Figs. 3, 4, and 5) can

[3] "Sorption of Water by Organic Insulating Materials," by R. L. Taylor, Bell Laboratory Record 17, 370-372 (1939).



7 — Moisture absorption after 4-hr. exposure as a function of thickness for cellulose acetate and XP and XXX phenolic sheet samples

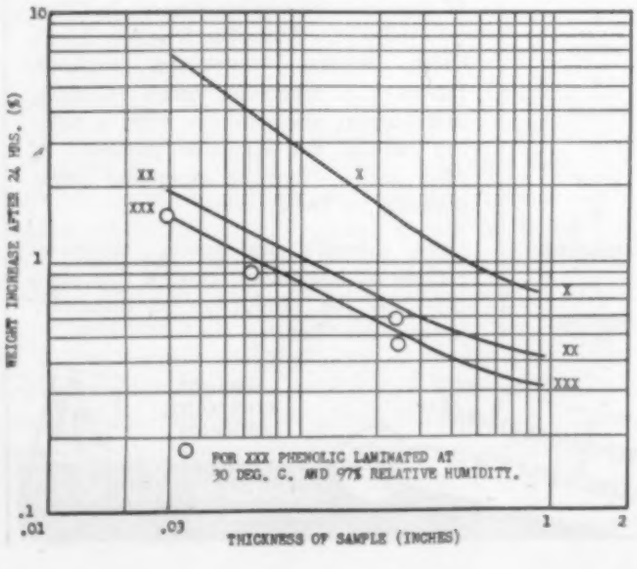
be used to predict the water content of materials exposed to a fixed relative humidity and a constant temperature for a given length of time, provided the time period in question is less than the time required for the sample to reach equilibrium.

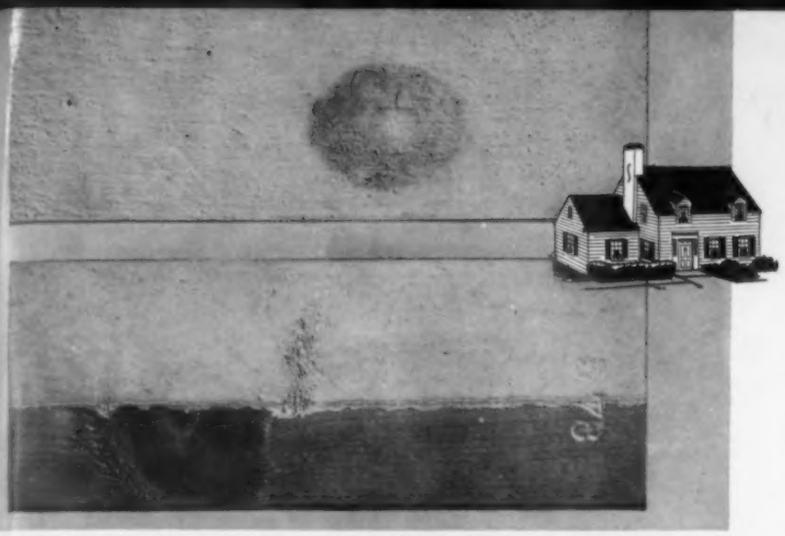
This straight-line relationship is also indicated by the work of Kline, Martin, and Crouse[4] when their data are plotted on the logarithmic scales (see Fig.

(*Please turn to page* 177)

[4] "Sorption of Water by Plastics," by G. M. Kline, A. R. Martin, and W. A. Crouse, MODERN PLASTICS *18*, 119 (Oct. 1940).

8 — Moisture absorption by 1 by 3-in. laminated phenolic strips of various thicknesses after 24-hour water immersion at 25° C. (Data for plot are average values obtained from National Electrical Manufacturers Association standards)





The end of a KNOTTY PROBLEM!

❶ Paint applied to unsealed knots soon fails (top). But a knot sealer that makes paint last on knots as long as on plain wood has been recommended by the Western Pine Association over some 600 others. It is WP-578, a practically colorless liquid based on BAKELITE Varnish BV-9700-S and VINYLITE Polyvinyl Butyral Resin XYHL. It has made millions of feet of economy grade lumber suitable for exterior siding—and its success has led to study of its usefulness for sealing plaster and other materials.

BAKELITE NEWS NO. 4

NOTES FROM BAKELITE CORPORATION ON BETTER, FASTER, LOWER COST PRODUCTION WITH "BAKELITE" PLASTICS

What! No SOAP Worries?

❷ Correct! For an added optional feature of the new Bendix "Gyromatic" Home Washer is this automatic soap injector that ends the housewife's chore of measuring soap for the laundry. Set a dial, and soap or detergent in the right amount is added to the water. The injector housing is economically molded from BAKELITE Phenolic Plastic, to resist chemicals, hot water, vibration, and torque of the driving pulley. It all adds up to long service!

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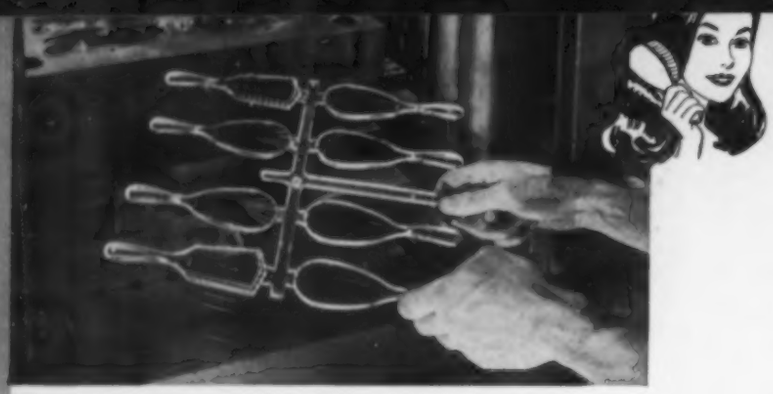
❸ Here's one for the youngsters to grow on! It's a "Step-Up Set" of International's 1847 Rogers Bros. silverplate, covered by sparkling-clear BAKELITE Styrene Plastic with a richly colored, tight-fitting base of the same material. It holds baby's first spoon, a set of pieces to use when he's a little older, and one for use when he's really mastered his table manners. The permanently attractive case is easily cleaned with a damp cloth. It is moisture- and chemical-resistant and dimensionally stable—advantages that point up the usefulness of this plastic for hundreds of new packaging uses.

PLEASE TURN THE PAGE



BEAUTY injection-molded into BRUSHES!

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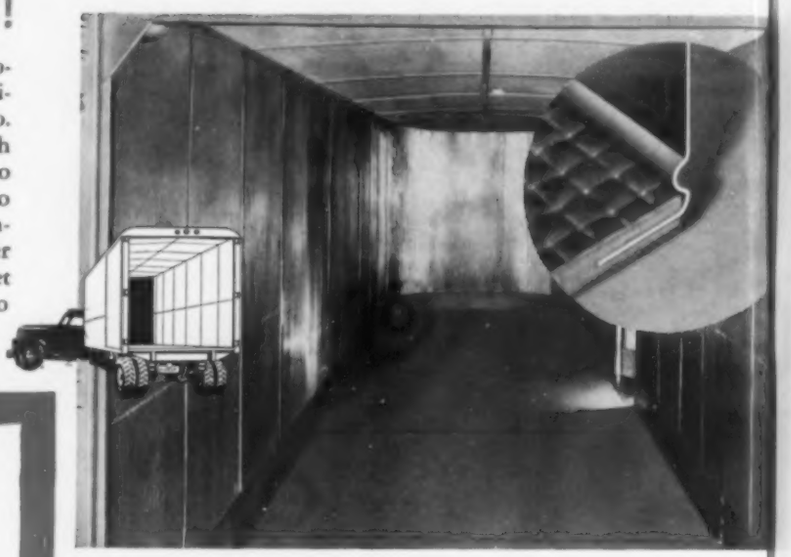

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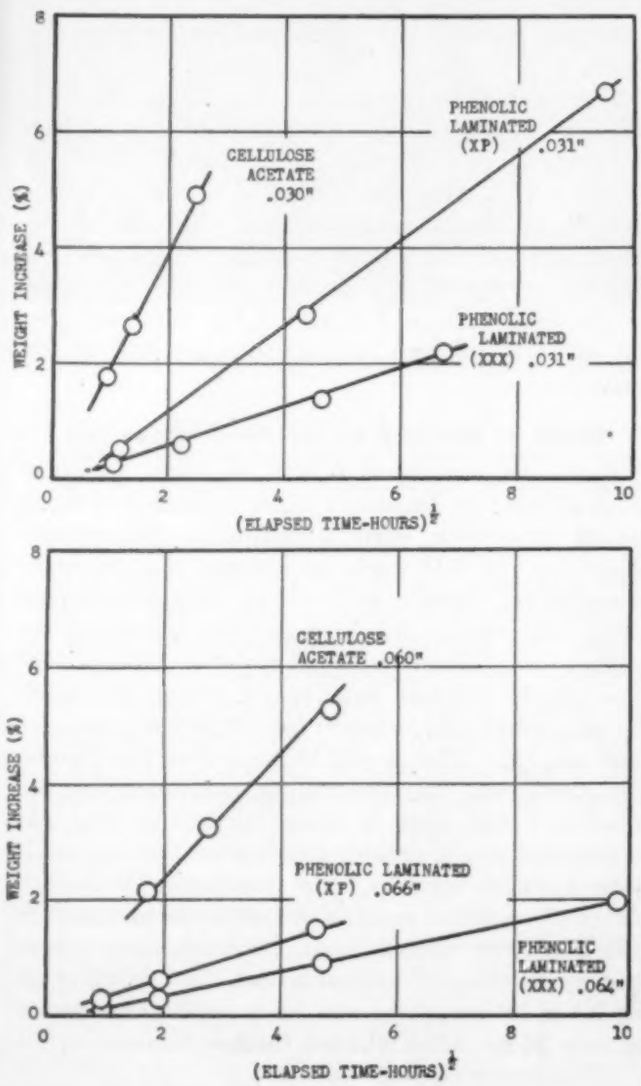
6). In Fig. 6, the curved line for the molded phenolic material indicates a leaching of water-soluble material, since the slope of the line decreases before equilibrium is reached. As stated previously, this leaching effect is non-existent in the present work at 97% relative humidity. All samples tested in this investigation gave a straight-line relationship.

The fact that the lines in Figs. 3, 4, and 5 are straight and parallel for a given material indicates that the relationship for a definite thickness of plate, where the edge area is small relative to the total area, may be represented by the expression $W = Ct^n$. On a log-log plot, $\log W = n \log t + \log C$. If a plot is made of thickness against moisture absorption for a definite time, the result should be another straight-line relationship telling how the intercept "log C" for a given value on the abscissa varies with thickness of material. This relationship is shown in Fig. 7 for the cellulose acetate samples, the XXX grade phenolic, and the XP grade phenolic samples. Notice that the XXX grade phenolic laminate varied from

9 and 10 — Comparison of the rate of moisture pickup for samples of various materials of equal thickness



the straight line, indicating that the samples of XXX material of varying thickness were not of the same composition. Figure 8 shows the moisture absorption of grade X, XX, and XXX laminated paper base phenolic sheet after 24-hr. water immersion for various thicknesses, the data being obtained from the NEMA standards.

The data obtained in the present investigation indicate that the rate of absorption is approximately proportional to the square root of the time (see Figs. 9 and 10), that is, "n" in the equation $W = Ct^n$ is approximately 0.5. This relationship was also found by Taylor,[5] who mentioned a sorption coefficient for comparing different materials, the coefficient being the slope of the line for a sample of unit thickness when the increase in weight is plotted against the square root of time. Figures 9 and 10 show comparison rates of moisture pickup of three materials of similar thickness.

An examination of Figs. 9 and 10 shows that the mass of water transferred through the surface of the plastic sheet is approximately inversely proportional to the thickness of the sheet for the 0.030 and 0.060-in. thick samples. These plots of percent absorption versus square root of time also indicate that the absorption followed the capillary law with cellulose acetate and laminated paper phenolic sheet.

The present investigation emphasizes the importance of thickness in grading plastic sheet. The writer believes that experimental results from two or three thicknesses of a plastic sheet are sufficient to show an approximate relationship for other thicknesses (see Fig. 7) so long as data are obtained on samples whose edge area is negligible compared to the total area, and provided the capillary law, $W = Ct^{1/2}$, is followed during the major part of the absorption.

Effect of moisture on electrical properties

Insulation resistance is the electrical property most affected by moisture. This resistance is made up of two parts, surface resistance and volume resistance. In this work no attempt was made to measure the surface and volume resistance separately. The results indicated that the insulation resistance was a function of the moisture pickup until the sample reached equilibrium, when the value became practically constant for the phenolic samples (see Fig. 11). This would indicate that the volume resistance was the controlling resistance for the plastics tested, that is, water absorption and not adsorption was of greater significance. For the cellulose acetate samples, the insulation resistance dropped until the equilibrium with the moisture in the chambers was obtained, at which time a temporary leveling off was observed. This leveling off at 2.4×10^4 megohms was for a period of approximately 24 hr., after which a further decrease in the

[5] See page 371 of reference cited in footnote 3.

Matched end sections, arm caps and kick plates, molded by Laminated Plastics, Inc., Cleveland, Ohio, of PARAPLEX P-43 and Fiberglas mat, made by Owen-Corning Fiberglas Corporation.

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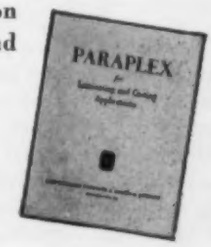

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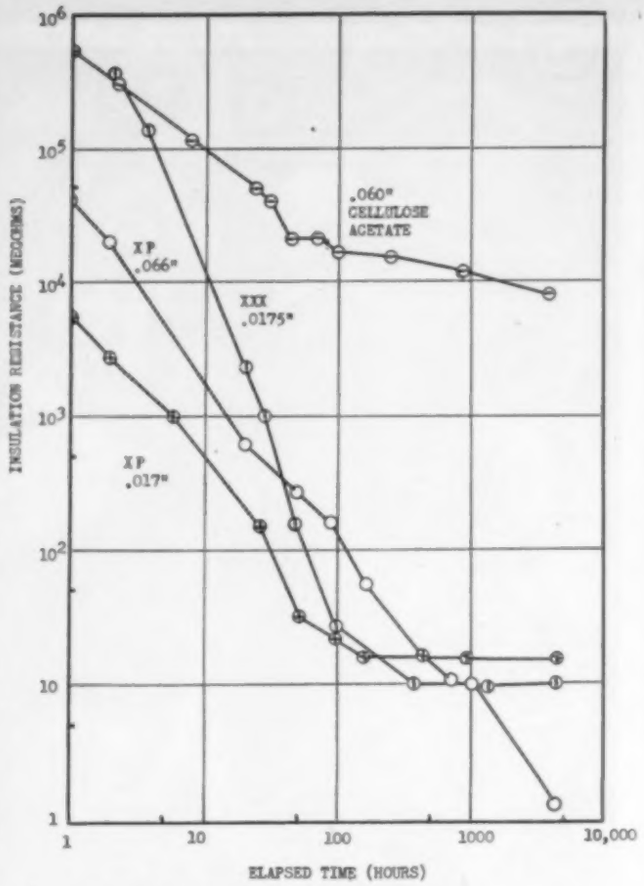


11 — Relationship between insulation resistance and time of exposure to 97% relative humidity for samples of different sheet materials

insulation resistance was observed and a new equilibrium point was approached. After more than 4000 additional hours, the value for the insulation resistance was 7.5×10^3 megohms. Since the initial leveling-off period occurred when the sample had reached equilibrium as far as moisture pickup was concerned, the additional drop must have been caused by some internal change. This phenomenon was observed for cellulose acetate butyrate by Field,[6] who explained that: "The water must be kept in unconnected pockets to prevent conduction. Eventually the water in the isolated pockets joins and provides normal volume resistance."

It is significant that cellulose acetate, although having a higher rate of moisture absorption and a higher percent moisture absorption for any given time up to the equilibrium value for the acetate, has a much higher insulation resistance than XP or XXX laminated phenolic. The XP and the XXX undoubtedly offer more direct paths between the electrodes due to the capillary effect of the paper laminations.

Figure 12 was obtained by taking values of percent moisture absorbed from Figs. 2 and 3 and plotting them against values of insulation resistance

[6] "How Humidity Affects Insulation," by Robert Field, General Radio Experimenter 20, No. 343, 11.

after the same time of exposure taken from Fig. 11. Presentation of the data as in Fig. 12 gives a ready comparision of sheet plastic materials for electrical purposes, provided the moisture saturation values of the materials compared are of the same order of magnitude. Figure 12 indicates that the relationship between the insulation resistance and the percent moisture absorption for the sheet plastic material tested can be indicated by the expression $Z = \frac{b}{W^m}$, where Z represents the insulation resistance, W the percent moisture absorbed, and m and b are constants that depend upon the materials.

Conclusions

1. The method of measuring the rate and amount of moisture absorption of sheet plastic materials by exposure under controlled humidity offers a rapid, accurate method of grading and selecting these materials.

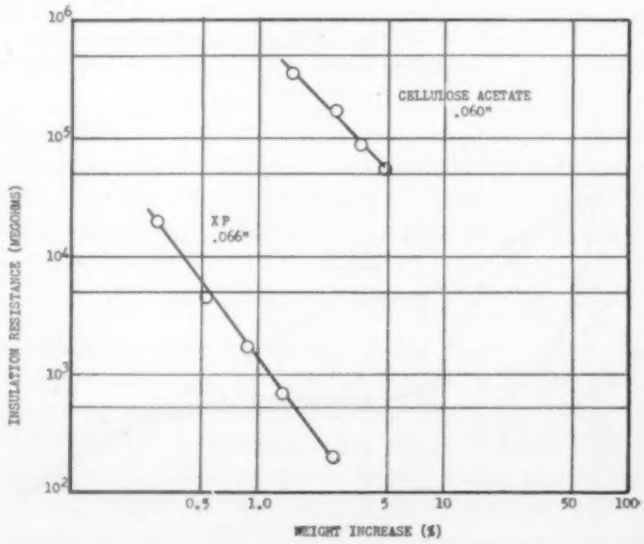
2. The mechanism of the absorption of water by sheet cellulose acetate and paper-base phenolic laminates is indicated by the capillary law $W = Ct^{\frac{1}{2}}$, where W is the percent weight increase, t the time, and C a constant.

3. The insulation resistance of plastic sheet is a function of the percentage of moisture in the material up to the point of moisture equilibrium, and an approximate straight-line relationship exists on log-log paper.

Acknowledgment

The writer wishes to express his thanks to Mr. L. C. Gilhousen of the Physical Testing Laboratory, Stromberg-Carlson Co., for making the insulation resistance measurements and Mr. K. L. Henderson of the Research Dept., Stromberg-Carlson Co., for making the photographs.

12 — Relationship between insulation resistance and percent moisture absorbed for cellulose acetate and XP phenolic samples of approximately the same thickness



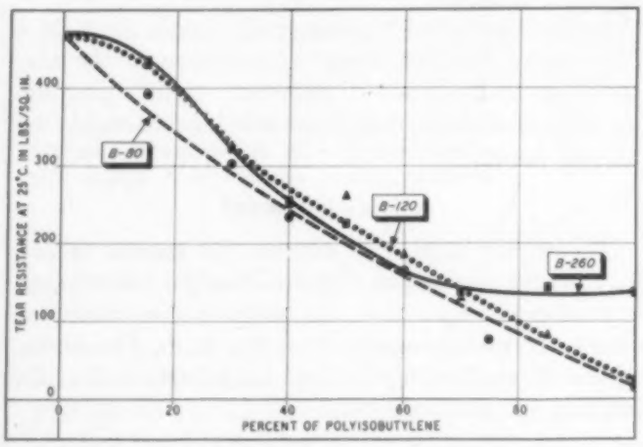
Polyisobutylene-Polyethylene

(*Continued from page* 124)

given previously, low molecular weight B-12 polyisobutylene and butyl rubber were blended in polyethylene (PM-1). In this work the concentration of olefin polymer and copolymer was held low. The results are reported in Table VII. These data indicate that the low molecular weight polyisobutylene gives slightly lower tear strength at room temperature than the higher molecular weight solid butyl rubber. However, the tensile strength and Shore hardness values, as well as ultimate elongation, are approximately the same at this low concentration of isoolefin polymer for the low molecular weight product as the high molecular weight butyl. The results indicate that butyl rubber may have some value as an extender and plasticizer for polyethylene.

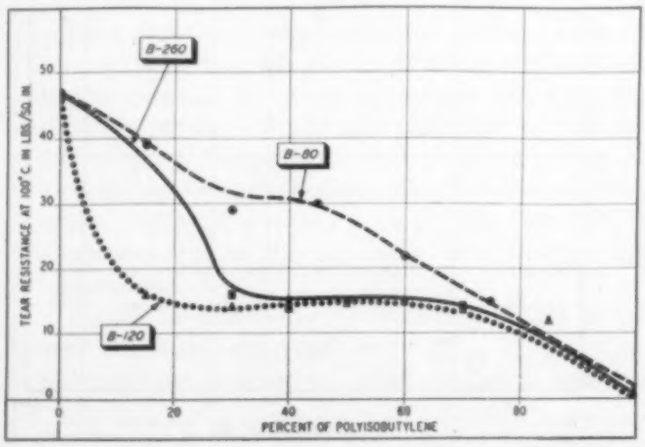
Conclusions

Based on a broad over-all look at the data previously discussed it is indicated that blends of polyiso-



7 — Tear resistance of polyisobutylene-polyethylene blends at 25° C. (A.S.T.M. D 624-44)

8 — Tear resistance of polyisobutylene-polyethylene blends at 100° C. (A.S.T.M. D 624-44)



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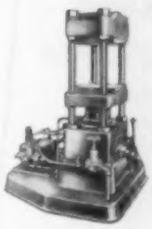
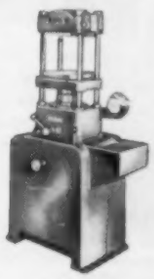


Power-petuator, shown at rear of press, is enclosed in base of floor-types.



30-TON BENCH-TYPE

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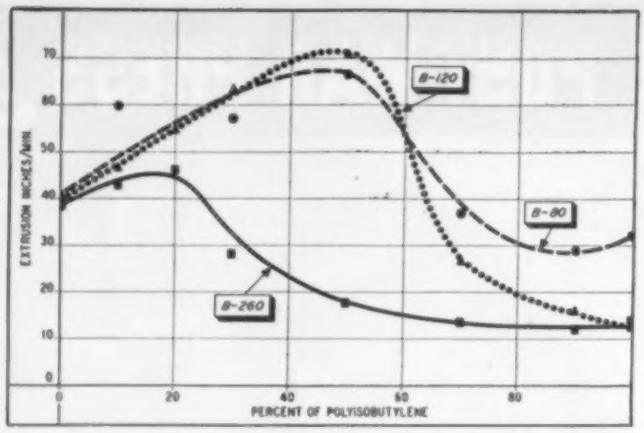
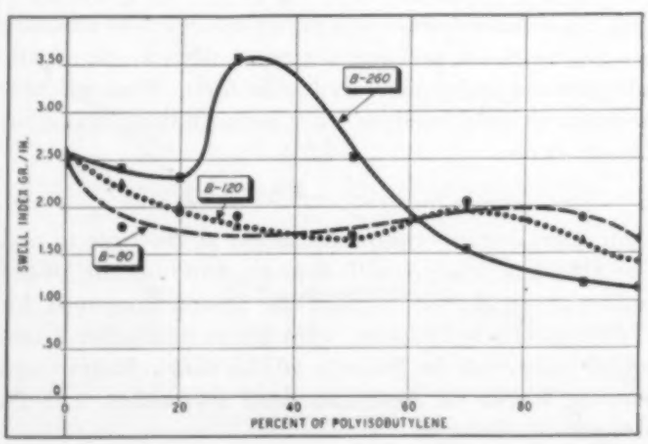


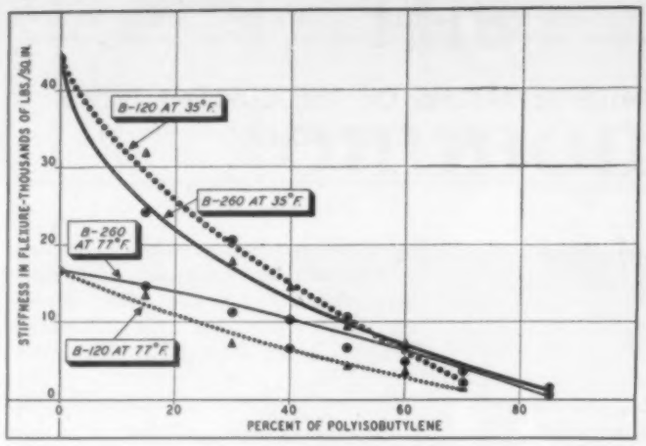
9 — Extrusion rate of polyisobutylene-polyethylene blends. Extrusion temperature was 280° F. (See note d, Table VII)

butylene and polyethylene, as well as of butyl rubber and polyethylene, may be employed to make many useful materials including wire insulation, sheeting, paper coatings, food packages, catalyst packages, carbon black packages, etc. The concentration of polyisobutylene should be kept below 60% to avoid seriously impairing the attractive properties of polyethylene. Furthermore, it appears from this work that small concentrations of polyethylene in polyisobutylene improve many of the properties of this latter polymer and it may be quite possible to thereby increase its usefulness. B-120 seems to possess more advantages for blending with polyethylene than either B-80 or B-260.

Tensile strength, modulus, tear resistance, Shore hardness, heat softening, and heat resistance are lowered with increasing concentration of polyisobutylene. The effects in most uses are not serious, however, until concentrations above 50% are exceeded.

10 — Extrusion swell index of polyisobutylene-polyethylene blends. Extrusion temperature was 280° F. Extrusion swell index was obtained by dividing the weight of tubing in grams by the length of tubing in inches extruded per minute. It was recorded as grams per inch





11 — Stiffness of polyisobutylene-polyethylene blends (A. S. T. M. D 747-43T)

Elongation is increased with increasing concentration of polyisobutylene.

Up to about 50/50 blend the processability is improved by the use of polyisobutylene.

Gas and moisture vapor permeability are improved by the use of polyisobutylene in polyethylene.

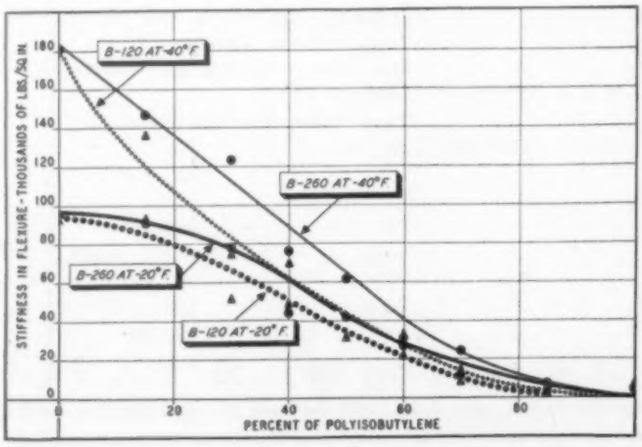
Polyisobutylenes do not improve the flex resistance of polyethylene until the concentration of the former dominates the blend. However, even in small concentrations polyisobutylene improves the flexibility at temperatures of 77 and 35° F., or presumably above the brittle temperature of the two polymers.

Over the range of concentrations which were studied, butyl rubber as well as polyisobutylene to all appearances is completely compatible in solid polyethylene.

Acknowledgement

The authors gratefully acknowledge the cooperation received from L. B. Turner, B. M. Vanderbilt, and W. J. Sparks.

12 — Stiffness of polyisobutylene-polyethylene blends (A. S. T. M. D 747-43T)



Polystyrene marches on to new horizons

AMONG the least heralded but more significant "first-time-shown" products at the Third National Plastics Exposition were two new polystyrene molding materials announced by the Dow Chemical Co., Midland, Mich.

Apparently more concerned with demonstrating the value of the company's merchandising campaign to injection molders than promoting its new compounds, the Dow exhibit was used primarily to show how the company's selling technique, backed by nation-wide distribution plans, labeling, and quality products, would aid the industry and incidentally encourage molders to get on the band-wagon with Dow. With that kind of a program to promote, the company evidently eschewed diverting attention by refusing to emit loud blasts concerning its new material developments. Furthermore, Dow has generally been ultra conservative in releasing information concerning new materials with which there has been only limited experience. Yet, these new polystyrenes are of unusual interest and merit the attention of all those concerned with thermoplastic products even though the materials are still considered in the specialty classification.

Ever since its introduction, polystyrene has been somewhat limited in application by its brittleness and lack of light stability. The new materials aim at improving flexibility and resistance to yellowing for use indoors—or outdoors when the product is not exposed to weather, as in automobiles. Company officials have not disclosed their process for making these improvements, but there is reason for belief that at least one of the materials is a copolymer.

The new Styron 637 designed for improved light stability has a useful life before yellowing which is several times that of previously available commercial polystyrene. It sells for 28½¢ in clear and 34½¢ in colored material, or 1½¢ a lb. over standard formulations. In general, it fabricates in the same fashion and under the same conditions as other Styrons, differing only in that prolonged heating at fabricating temperatures should be avoided. Only one grade is supplied for injection, compression, and extrusion fabrication. Colors are limited to crystal and a range of translucent to opaque whites. Physical properties, with the exception of light stability, are much the same as other high quality polystyrenes.

The manufacturer points out that light stability of Styron 637 applies to indoor use only. Outdoor weatherability calls for not only light stability, but also other chemical and physical characteristics which are not claimed for this material.

Styron 637 is recommended as a promising material for diffusion shields, reflectors, etc., in fluorescent lighting particularly, because it will remain white without fading to yellow after a protracted period. In automotive applications, it is recommended for dials, dash panels, escutcheons, and parts likely to be exposed to sunlight inside a car.

Clarity and resistance to yellowing make Styron 637 adaptable for

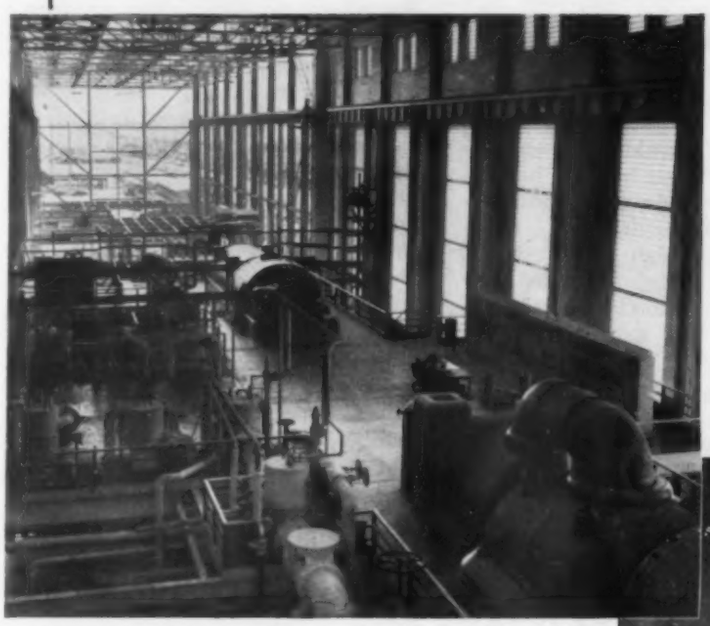
Properties of Styron 475

Properties	*Method*	*Units*	*Value*	*Range*
Tensile strength				
stress at 1% offset	D638-46T	p.s.i.	3500	±500
stress at ultimate	D638-46T	p.s.i.	4500	±500
Elongation	D638-46T	%	27	±7
Modulus in tension	D638-46T	x10⁵ p.s.i.	3.3	±0.1
Impact (izod)				
notched 77° F.	D256-47T	ft.lbs./in.notch	1.0	±0.2
unnotched 77° F.	D256-47T	ft.lbs./in.width	9.5	±2.0
Flexural strength	D790-45T	p.s.i.	7000	±500
Modulus in flexure		x10⁵ p.s.i.	3.2	±0.1
Hardness Rockwell M	D785-47T		6	
L			75	±5
R			106	
Heat distortion	D648-45T	°F., 264 p.s.i.	156	
Water absorption 77° F.	D570-42	% gain 24 hr.	0.06	
Specific gravity			1.05	±0.01
Electrical properties				
dielectric constant	D150-46T	10³ cycles	2.50	±0.05
		10⁶ cycles	2.48	±0.05
		10⁹ cycles	2.46	±0.05
power factor		10³ cycles	0.00027	±0.0002
		10⁶ cycles	0.00054	±0.0002
		10⁹ cycles	0.00079	±0.0002
Chemical properties		Soluble in aromatic and chlorinated hydrocarbons, ketones, ethers. Insoluble in weak acids, alkalies, alcohols.		
Effect of sunlight		Less stable than polystyrene.		
Flammability at ⅛-in. thick	D635-44	in./min.	2.2	
Machining properties			Excellent	
Fabrication				
Injection—temp.		°F.	400-450	
pressure		p.s.i.	15,000-18,000	
Compression—temp.		°F.	350-400	
pressure		p.s.i.	1500-2500	
Extrusion—temp.		°F.	390-400	
Apparent density			0.5	

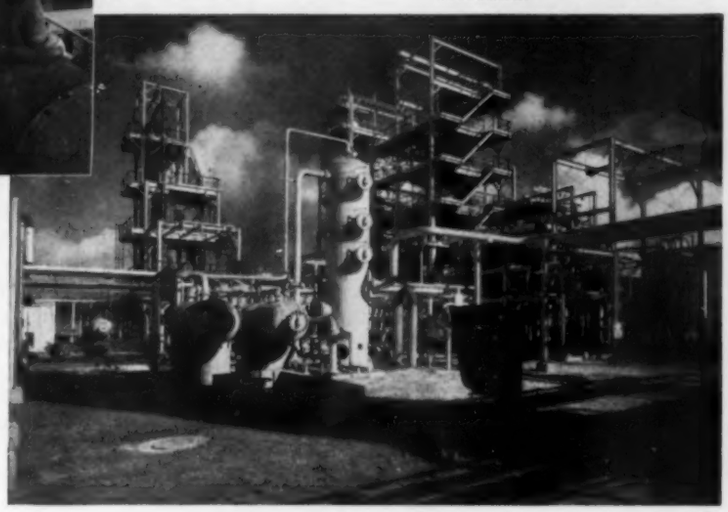
These are average property values and should not be used for specification limits

*Reg. U. S. Patent Office.

THE Common denominator



Interior view of First Section of new Redondo Steam Station of Southern California Edison Company, now under construction at Redondo Beach, California.



Crude Alcohol Unit of the Esso Standard Oil Company's Refinery at Baton Rouge, Louisiana.

Experience is the common denominator which is essential to the success of any project, large or small. The many years of experience of Stone & Webster Engineering Corporation in engineering, design and construction covers a wide range of diversified projects.

STONE & WEBSTER ENGINEERING CORPORATION

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THE PLASTISCOPE

moldings which are painted on the underneath side, and the crystal compound has color permanence which makes it suitable for lens systems and other optical parts.

Styron 475, the new, rigid, tough thermoplastic introduced by Dow, was particularly interesting to this observer. Any time that polystyrene or a near relation can be made tougher and more flexible, it will intrigue anyone who is concerned with plastics. Company literature says that this new material is characterized by a combination of physical properties unlike those of any other commercial thermoplastic. It is designed primarily to fill the gap which exists between rigid, dimensionally stable polystyrene and the tough cellulose derivative plastics and, it is claimed, combines many of the outstanding properties of these two types into one material. Company officials are careful to point out, however, that Styron 475 does not presently have the toughness of acetate, butyrate, or ethyl cellulose.

With a base price of 39¢ a lb., Styron 475 has properties similar to regular polystyrene except that its impact strength is three to five times greater and its elongation 10 times that of regular polystyrene. It can be fabricated by conventional injection, compression, and extrusion molding methods; but the normal injection temperature is 30 to 50° F. lower than ordinarily used for polystyrene, or from 400 to 450° F. throughout the heat zone. Molding pressure usually ranges from 15,000 to 18,000 p.s.i. Surface luster is less than that of regular polystyrene, but buffing will give a high gloss. Mold shrinkage is about 0.001 to 0.003 in. per inch. Compression molding procedure is little different from that employed with standard polystyrene. Extrusion may be accomplished on standard plastic extrusion equipment at rates equal to or better than standard polystyrene with slight variations in the torpedo.

Colors are limited to opaques, but new ones are expected later. There has not been enough experience to determine its stability or compatability for color.

Styron 475 is recommended particularly for refrigerator breaker strips, knobs, assemblies employing metal inserts, electrical applications, hardware items, housewares, toys and novelties. The properties are given in an accompanying table.

Dow has also announced availability of Styron 683, a high heat resistant polystyrene, at no increased price. This material has been in the hands of molders in experimental lots for some months, but the company has made no public announcement of the details.

Another new high heat-resistant polystyrene, being produced by Koppers, is described in an article on page 91 of this issue.

Low-pressure industries meeting

THE S.P.I. Reinforced Plastics Div. is the new name for the former S.P.I. Low-Pressure Industries Div., according to a recent announcement by The Society of The Plastics Industry, Inc. The plastics products covered will remain essentially the same.

The Fourth Annual Technical Session of the Reinforced Plastics Div., will be held on January 12, 13, and 14, at the Edgewater Beach Hotel in Chicago, Ill. An exhibit will be included in the program.

General chairman of the S.P.I. Reinforced Plastics Div. is Robert J. Brinkema of Egmont Arens, New York, N. Y. Program chairman for the January meeting is Harold Freeman of American Cyanamid Co., New York, N. Y. Leonard Meyer of Western Products, Inc., Newark, Ohio, is chairman of the Exhibit Committee.

Standards for Plexiglas signs

AN Underwriters' Laboratories, Inc., report, Electrical No. 18871, dated August 11, 1948, covers the utilization of Plexiglas in electric signs. The report shows that Plexiglas is recommended by the Underwriters' if used in accordance with the requirements of its Standard for Electric Signs. This report is reviewed in Books and Booklets, page 146.

Defense counsel

IN a staunch defense of the plastics industry and its ability to take care of criticism that may be leveled at it, Michael A. Brown, Jr., sales promotion manager of the Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio, told the Society of the Plastics Industry of Canada in Toronto, Ont., that the industry had no reason to fear complaints that were registered against it and was perfectly capable of taking care of its own problems. The nub of Mr. Brown's remarks are contained in the following paragraphs lifted from his talk:

"As you all know this industry is very open to criticism of itself. At every meeting of local or national groups in the S.P.I. or in the Plastic Materials Manufacturers Association, we berate ourselves loudly. We invite people to criticize our materials, our products, and our business practices and they tell us with great authority what must be done to correct these situations.

"I am thoroughly in accord with certain of group activities that are being carried out to inform the public more fully on our products, but I think a much greater effect is being had by the individual activities of plastics companies who are taking their story to industry and to the general public in well planned, well financed, and well executed campaigns.

"I sincerely believe that the return of the normal competitive situation in the industry has done more to eliminate bad products and unsuitable applications than all the policing schemes could do in 10 years. I think many discussions, particularly those conducted by people outside the industry, tend to overlook these very powerful forces of competition which are at work continuously. The good application that is well advertised and properly sold inevitably drives off the bad product or the one which is improperly or deceitfully promoted."

Pipe identification

A SPLIT sleeve made of laminated vinyl and paper, with an identification word printed on the paper, has been designed to be slipped over piping to name the material flowing within. Placed on the market by Master Plastics, Wilmington 83, Del., the tubes are called Master-Seal pipe identification bands and are supplied in colors specified by safety codes. Since the paper with the identifying word printed upon it is covered with vinyl, it will withstand almost any acid and should be particularly applicable in chemical plants and laboratories or any place where identification of piping is desirable.

The laminated split sleeves, about 8 in. long, are simply snapped over

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the pipe to be identified. They sell for 21¢ to 80¢ each in sizes that will fit from ¼ to 5-in. pipe. Identification of these pipes is ordinarily done by the more costly process of painting them in various colors.

Preparedness

A TASK force consisting of Lawrence Brown, Frank Carman, and L. A. Schlueter has been appointed to confer with William T. Hack of the National Security Resources Board on a study of control methods used in the chemical industry during World War II. From this study, they will gather information and recommend the type of control methods that might be necessary for scarce chemical commodities in the event of any future emergency.

The plan receiving particular attention is the M-300 type of chemical order which was used during World War II. This plan permitted flexible control as was required by the change in the balance of supply and demand and individual requirements. Under this M-300 method, the supplier may be told to ship a given amount to specific customers who are, in turn, required to use it for specified purposes. The Controlled Materials Plan, about which there has been so much talk in the press, does not apply to plastics but is being considered for commodities such as steel, copper, aluminum, etc.

The NSRB is also starting the study of various sections of the industry to determine the potential supply and requirement situation in time of emergency. Messrs. Carman, Schlueter, and others are acting as consultants in these studies. This is an over-all project tied in with both the NSRB and the Munitions Board Advisory Committee.

Brown, Carman, and Schlueter are all well known to the plastics industry through their work in the Chemicals Bureau of the War Production Board during World War II.

Molding high styrene resins

REFERRING to a series of articles in MODERN PLASTICS last Summer concerning the development of high styrene-butadiene resins, the following letter has been received from the Dewey & Almy Chemical Co., a producer of that resin:

"We should like to point out that the designation which you used, Darex, is Dewey and Almy's trade mark for most of their products. The high styrene resins should have been referred to as Darex Copolymers No. 3, X34 and X43.

"Your article mentioned that the high styrene copolymers had not been successfully injection molded. We might point out that one of the first plastic products made from Darex Copolymer X34 was an injection molded fluorescent light fixture which you show in your 'Modern Plastics Encyclopedia.' Since that time, we have also made poker chips, coasters, and a variety of other products.

"Our more recent work has been to use Darex Copolymer X34 as an extender and plasticizer for polystyrene in order to make the latter material useful in applications where ordinarily it would be too brittle. The X34 greatly improves the impact strength." Signed, K. M. Fox, Organic Chemicals Div., Dewey & Almy Chemical Co., Cambridge 40, Mass.

Help!

A CORRESPONDENT has requested us to help him obtain the answer to the following question: "What is the name of the hardest plastic that could be used outdoors all year around in the coldest and hottest weather without any damage from weather, that is fireproof, that will last for many years? What is the price of it by the pound and how many pounds in a block 2 ft. by 2 ft. and 4 ft. long?"

We would be glad to pass on the answer if anyone has it.

Laminate standards

STANDARDS for laminated thermosetting decorative sheets have been announced by the National Electrical Manufacturers Association, under the formal title of "NEMA Standards for Laminated Thermosetting Decorative Sheets." Standard grades, thicknesses, tolerances, and various tests for resistance to wear, boiling water, high temperatures, stains, color fastness, moisture, and dimensional change are described. The last section is devoted to recommended techniques for applying decorative laminates.

D. J. O'Conor, Jr., chairman of the NEMA Decorative Laminate Group, points out that architects and builders now have, for the first time, a precise set of standards for use in setting up specifications on projects involving decorative plastic laminates. The new standards are being published by the National Electrical Manufacturers Association, 155 E. 44th St., New York 17, N. Y.

Army Engineers' model shop

TO anyone who has never seen the fabrication work done by the Army Engineers, an eye opener is in store if he ever has the opportunity to visit their shops. The model shop of the Corps of Engineers of the United States Army at Fort Belvoir, Va., contains a galaxy of acrylic models, either cast or fabricated on the spot. Used as training aids, these visual or working models are used to train soldiers in the intricacies of Diesel engines; pumps, motors, and other mechanical devices of which an engineer must acquire a knowledge.

Of particular interest are a complex carburator mechanism with movable parts, and a fairly large scale model refrigeration system by which the student engineer can be given a visual understanding of refrigeration principles. In case of war, literally thousands of these models would be in demand.

The Engineers' model shop is currently on the lookout for a more satisfactory clear, water white plastic to be used for embedment specimens. So far they have found nothing suitable for layers over ½ in. thick.

Pride of the shop is the widely known beacon dome. Each of these big domes, used to supplant glass domes for airfield beacon towers, is 30 in. in diameter and 30 in. deep, blown from a ½-in. thick sheet of flat acrylic. Temperature of the oven in which processing takes place is kept at 375° for 3 hours. Pressure is started at about 3 lb. and gradually increased to five. When the dome is about 3 in. from the desired height, it is removed from the oven to prevent rupturing and a pressure of 13 lb. is applied to finish the blowing.

Model bridges—Another interesting Army development is found in combination metal and cellulose acetate butyrate model bridges. Since bridge building is an A-1 requirement for Army engineers, every man must

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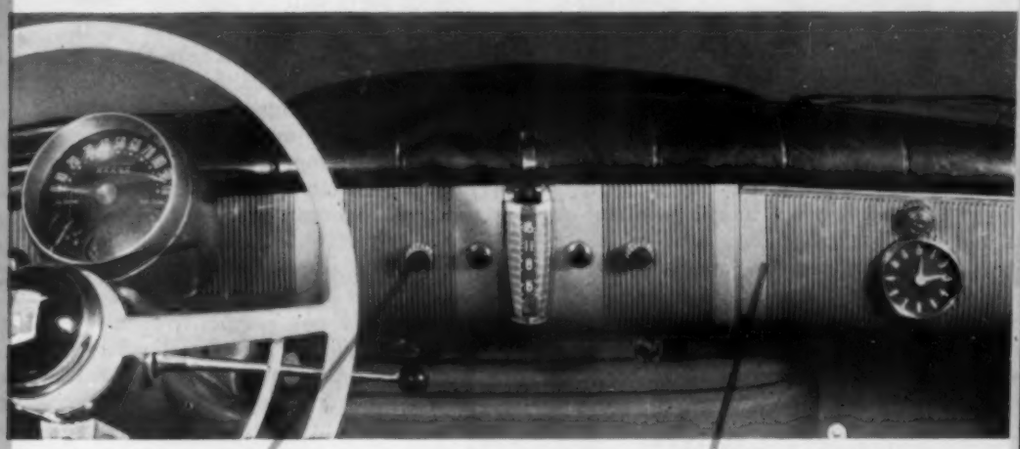
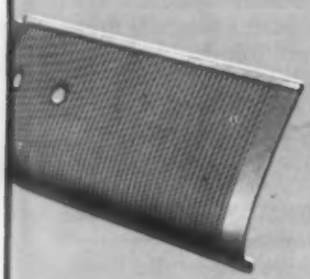
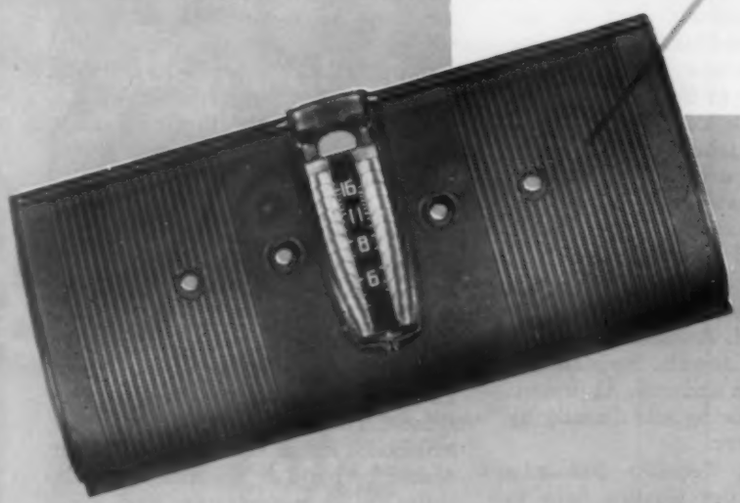
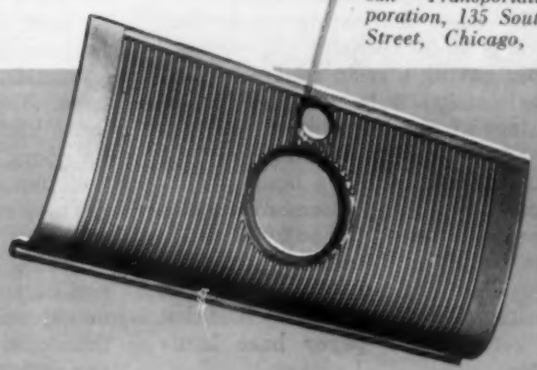
for economical adaptability





Molded by General American Transportation Corporation, 135 South LaSalle Street, Chicago, Illinois





The '49 Nash sets the pace with a new STYRON (Dow Polystyrene) instrument panel. The originally designed instrument panel looked good on paper—BUT to prove practical, it had to be constructed of a material that was (1) adaptable to Nash's new "cockpit control" and (2) economical enough to use on a very large scale. Nash chose STYRON. The versatility of STYRON solved many of the interior designing problems. The low cost and high quality of STYRON permitted its use in mass production. STYRON, America's number 1 plastic, again has proved itself the *right* plastic for the *right* job.

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learn all the basic principles. Thousands of models are used to teach bridge building technique.

Low-cost laminate

NOW being marketed by the Plastic Products Div. of The J. P. Lewis Co., Beaver Falls, N. Y., is a new high pressure extended thermosetting laminate which is called Tensilite 300.

While not a direct replacement for conventional laminates, the low cost of the new extended material is attractive where technical perfection is not necessary; the price of Tensilite 300 will open fields for laminates hitherto closed because of cost.

The product is the result of several years of development and research in finding the proper resins, pulp, and the techniques for combining them on the paper machine. In manufacture, the specially prepared pulp is combined with resins on a conventional cylinder machine, the treated base stock being continuously formed as a web approximately 82 in. wide which is rolled up or cut for subsequent lamination.

The basic laminating stock thus made is an inexpensive impregnated paper having a resin content of approximately 38 to 42%, a volatile content of about 4%, and a weight of approximately 145 lb. per 1000 square feet. It is then laminated in presses in a conventional manner to give sheets from 0.021 to 1.0 in. thick. The resulting laminate is priced from 25 to 35¢ per lb. depending on thickness, or approximately half that of conventional paper base laminates.

One-way strength—From the point of view of quality, Tensilite 300 compares favorably with conventional laminates except for heat resistance (not being recommended for use above 160° F.), somewhat lower bonding strength; and as the fibers are somewhat parallelized on a cylinder machine, the material is much stronger with than across the grain. For instance, the tensile strength lengthwise averages about 17,000 to 18,000 p.s.i. and 7000 to 8000 p.s.i. crosswise. The moisture absorption in 24 hr. at room temperature averages from 2 to 3% and it is resistant to most chemicals except alkalis, chlorinated solvents, and some other organic reagents. Electrically, the material has a dielectric strength of about 500 volts per mil and a power factor at 10^6 cycles of about 0.04.

The manufacturer believes that there are two general fields in which Tensilite 300 will be particularly suited. First is in electrical and industrial applications where component parts will be fabricated with savings in cost. This is particularly true of thick sections where the low per lb. cost of Tensilite will create tremendous savings; as the material can generally be punched, using techniques comparable to those used on conventional laminates, significant savings can also be made on thinner parts.

Secondly, while the material at about 25 to 30¢ per sq. ft. in ⅛ in. thickness is not competitive pricewise with such building materials as pulpboard and hardboard which sell at from 4 to 11¢ per sq ft., Tensilite 300 is so much denser, harder, smoother, and more water resistant than those materials that its use for such constructional applications as bathroom, kitchen, and laundry wainscoting—or as factory partitions—should absorb considerable tonnage. Also, as fabricated hardware items such as push and kick plates for doors, the material is competitive with materials like steel and glass.

The preferred sheet sizes for Tensilite are 40 by 40 in. and 40 by 60 in., although sheets up to 48 by 60 in. can be supplied. Available in black or natural dark brown, the standard finishes are satin and dull. At present the material is being sold directly by the manufacturer.

In summary, Tensilite 300 is a new entry in the plastics field in that it signifies the introduction of a satisfactory thermosetting laminated plastic at a cost that is fundamentally low because of the basic method of manufacture. Industrially, the material can substitute at considerable savings in such applications as terminal strips and insulating parts in radios, and in automotive and household switch parts where exposure to elevated temperatures is unlikely.

As a general construction material, Tensilite 300 is not competitive pricewise with existing soft materials, but for the amateur carpenter or harassed husband who does odds and ends of carpentering in the basement, it is a good working material. At its low price, it has been called the "poor man's plastic," and as such should find a future in lumber yards where the dealer can sell a few sheets at a time to the householder for any of the variety of purposes that the imaginative amateur can conceive.

RAW MATERIALS

Devran is the trade name of a new family of resins produced by Devoe and Raynolds Co., Inc., Louisville 1, Ky. While the primary use of Devran resins is in the field of protective coatings, their use in other resin applications is also indicated. The resins are polyhydric alcohols which are derived from bisphenol A and epichlorohydrin. They can be used in an unmodified form by the addition of other substances which act as catalysts or curing agents, thus converting them from a soluble, brittle, fusible form to an insoluble, hard, flexible, and infusible form after evaporation of the solvent. Among the suitable catalysts are butylated urea-formaldehyde resins and poly-functional amines such as diethylene triamine.

Potential non-coating applications for these resins include adhesives, casting and potting compounds, stabilizers for polyvinyl chloride resins, and molding resins. An interesting feature of these resins is their failure to shrink upon polymerization.

Clear Topping, a chemical resin coating for vinyl by Finishes Div., Interchemical Corp., 350 Fifth Ave., New York, N. Y., is claimed to be free of any tendency to craze or burnish and to lessen the residual tack inherent in plasticized vinyl compositions. This new coating can be air brushed, knife spread, or roller coated by hand or machine methods.

COMPANY NEWS

B. F. Goodrich Chemical Co. has announced that a portion of its new $3,000,000 Avon Lake, Ohio, plant will be used for production of plasticizers. Trial quantities are now available. Large-scale production will start in 1949.

The Standard Products Co., 2130 W. 110 St., Cleveland 2, Ohio, has announced the appointment of Harry D. Myers, former executive vice-president, as president and

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general manager. Dr. J. S. Reid, one of the founders of Standard Products and inventor and developer of many of its products and machines, has become chairman of the board and plans to devote practically his entire time to product development and research.

Owens-Corning Fiberglas Corp. has established a Pacific Coast Div., with L. R. Kessler as its general manager and W. C. Winterhalter as sales manager.

Construction of a new Fiberglas plant at Santa Clara, Calif., is well under way, and production is scheduled to start there in July, 1949, according to company officials.

Park Manufacturing Co., 910-940 Park Ave., Linden, N. J., is a new injection molding plant, which has its own tool room. A. Lange, formerly plant manager of Sterling Plastics Co., is the owner and proprietor.

St. Regis Paper Co., 230 Park Ave., New York, N. Y., has announced creation of a new Material and Control Dept. within its Panelyte Div., designed to expedite production and improve customer service. C. L. Walters will head the new department as supervisor. Announced at the same time was the appointment of P. P. Ryan as assistant general manager of the Panelyte Div., and W. E. Caldwell as plant manager.

General Electric Co. has announced a reorganization of its Chemical Dept., which establishes two operating divisions instead of four. Harry K. Collins and John L. McMurphy were named to managerial posts of the Plastics Div. and the Chemicals Div. respectively. Robert L. Gibson has been named assistant general manager of the Chemical Dept., and Dr. Charles E. Reed has been made engineering manager of the Chemical Dept.

Creative Printmakers, Inc., has been purchased by H. J. Warsager, Anthony Velonis, and Harry Knight, formerly plant manager, technical director, and sales manager, respectively of this company, who have announced formation of a new company under the name Ceragraphic, Inc. The plant is located at 250 South St., Newark 5, N. J. The entire staff of Creative has been retained, and improved automatic equipment has been introduced to make possible mass production of high quality "on the package" printing.

Lithgow Corp., applicator of protective linings based on Bakelite phenolic resins, has announced the formal opening of its new plant at Norwalk, Conn., to serve the chemical, food, beverage, paper, and process industries of the East. The main plant at Chicago, Ill., serves the rest of the country.

Bee Chemical Co., producers of Logoquant polystyrene treatment, has announced that its offices and plant are now located at 13799 S. Avenue O, Chicago 33, Ill.

Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio, has announced the promotions of Horton Spitzer to director of sales and Whiting N. Shepard to general sales manager. Mr. Spitzer joined the Toledo Scale Co. in 1928 and assisted in the early development of Plaskon. In 1936 he was made vice-president in charge of the former Plaskon Co., and was made general sales manager when that organization became the Plaskon Div. of Libbey-Owens-Ford. Mr. Shepard has been with Plaskon since 1932. He was made assistant general sales manager and advertising manager in 1938 and has been manager of glue and industrial resin sales since 1946.

Plax Corp., Hartford, Conn., has adopted the brand name "Plaxpak" for all its packaging materials produced of Plax polyethylene. The name will apply to film, "layflat" seamless tubing, and blown ware.

Atlas Powder Co. has discontinued the manufacture and sale of coated fabrics in its Stamford, Conn., plant, according to a recent announcement. Manufacture of industrial finishes and laundry roll and press covers will be continued.

Merix Chemical Co., Chicago 15, Ill., has announced the availability of Merix Anti-Static Compound #79. The company advises the new material is simple to apply by spraying, wiping, or brushing; is non-inflammable, fairly fast drying, and non-visible when dried; yet will prevent accumulation of static electricity. Spraying of plastic sheets and molded parts is one of a number of suggested uses for the material.

Godfrey L. Cabot, Inc., Boston, Mass., carbon black manufacturers, has announced plans for the formation of Cabot Carbon, Ltd., which will shortly begin construction of a new 20,000,000 lb. annual capacity carbon black plant near Liverpool, Eng.

Plax Corp., Hartford, Conn., has announced the opening of a regional sales office in Syracuse, N. Y., at 308 S. Collingwood Ave., with Arthur V. Todd in charge.

Synthane Corp., Oaks, Pa., has announced the appointments of Herbert Widdop, sales manager, and E. E. Smith, assistant sales manager.

Reynolds Metals Co., 19 E. 47th St., New York 17, N. Y., has announced the addition of a water-clear transparent vinyl to its line of Reynolon films. The film is identified as Reynolon 3000T and is presently being produced in thicknesses of 1.5 and 2 mils.

Reynolon 3000T is a vinyl film modified with a non-extractable and non-migrating soft resin. It is expected to be of considerable interest to food packers as well as consumers in the soft goods trade. The film has good resistance to greases and solvents and is not volatile in the presence of heat, it is reported.

Tinius Olsen Testing Machine Co. of Philadelphia, Pa., has moved to new and larger quarters adjacent to Philadelphia on Easton Rd., Willow Grove, Pa.

The Hydraulic Press Manufacturing Co. has moved its New York office to 500 Fifth Ave., New York 18, N. Y., with personnel remaining unchanged.

Forest Products Research Society has opened a drive to bring membership benefits to men in wood-using industries throughout the world. Stated purpose of the Society is "to cover the fields of research, development, production, or utilization of forest products by facilitating the interchange of information, abstracting results, publishing information, encouraging cooperation, providing test methods and procedures, sponsoring meetings, and, in general, encouraging and promoting the effi-

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cient utilization of wood and other forest products." Greatest stress is placed upon everyday problems of the allied industries. Dues are $10 per year. Requests for further details and/or applications for membership should be addressed to the secretary-treasurer, Charles E. Van Hagan, Box 2010 University Stn., Madison 5, Wis.

Monsanto Chemical Co., Plastics Div., has received recognition for its Plastics Merchandiser as the "best direct mail advertising campaign in the chemical industry" by the Direct Mail Advertising Assn., Inc., "in recognition of its excellence and the results achieved." Copies of the Merchandiser will be part of an exhibit which will tour the United States and Canada, under the sponsorship of the Direct Mail Advertising Association, to encourage the increased use of well-planned, effective direct mail.

Coaltar Chemicals Corp., 420 Lexington Ave., New York 17, N. Y., has been appointed American representative for Wm. Butler & Co. (Bristol) Ltd. Founded in 1843, the Butler company, distillers of tar and suppliers of rosin and petroleum, maintains refineries and ocean installations at Bristol, Eng. Under the new arrangement, Coaltar Chemicals Corp. will distribute a wide range of coal tar chemicals of British manufacture.

Eastman Kodak Co., Cellulose Products Div., Rochester, N. Y., has announced a new extruded Kodapak sheet and several new types of laminated Kodapak I sheet, clear. The extruded Kodapak sheet will be offered in such standard colors as clear, white, ivory, red, and blue, and at the present time is being produced principally in 0.015, 0.020, and 0.025 gages. The Kodapak I sheet, clear, is a laminated sheet available in gages from 0.030 to 0.060.

PERSONAL NEWS

Robert W. Stokes has been appointed sales manager of W. T. LaRose & Associates, Inc., Troy, N. Y., manufacturers of Thermall electronic heating equipment for the plastics, rubber, and wood-working industries. Mr. Stokes was formerly Eastern District manager of the Girdler Corp.'s Thermex Div., with offices in New York, N. Y.

F. Scott Carpenter, Jr., has been appointed to the Special Carbon Blacks Section of the Research and Development Dept. of Godfrey L. Cabot, Inc., Boston, Mass.

Len J. Herman, head of L. J. Herman & Co., 372 Post Office Place, Melbourne, Australia, is touring the United States and Great Britain in the interests of his organization, which represents numerous United States and British plastics firms and distributes raw materials and machinery throughout the Victoria, New South Wales, and South Australia sections.

Formerly an executive of Moulded Products (A'sia) Ltd., Mr. Herman established his own organization in 1946, is one of the founders of the Victorian section of the Plastics Institute of Australia, and is a delegate to the Federal Body of that country.

D. A. Hutchison, formerly assistant sales manager, has been named general sales manager of Sterling Tool Products Co., 1340 N. Milwaukee Ave., Chicago 22, Ill. He succeeds J. A. Proven who recently resigned. Announced at the same time was the appointment of H. P. Gangwer, comptroller, as vice-president of the company.

Charles L. Keller, formerly production manager of the Plastics and Automotive divisions of Fabricon Products, Inc., River Rouge, Mich., has joined the staff of the Morart Gravure Corp., Holyoke, Mass. He will assist T. W. Noble, general manager, in various departments.

Fred W. Thiemann, formerly production engineer with Resistoflex Corp., has joined Apex Plastics, Inc., Bayside, L. I., N. Y., as vice-president and tool room supervisor in charge of die design and manufacture.

Jay H. Kuhn has joined the staff of the MacDonald Manufacturing Co., New Baltimore, Mich., as sales engineer. He was formerly with Northern Industrial Chemical Co., and, previous to that, with Columbus Plastic Products, Inc.

Allen I. Barry, formerly with Charles Pfizer & Co., has joined Argenta Products Co., Eastport, Me., as production manager. He will be actively concerned with the company's pearl essence program through which special formulations of pearl essence have been developed for several types of plastics now on the market.

V. Paul Yale has been appointed district representative covering the states of Michigan and Indiana for Walker-Turner Div., Kearney & Trecker Corp., Plainfield, N. J.

Dr. Roy F. Layton, formerly of the Lusteroid Container Co., Maplewood, N. J., has joined the staff of the Applied Physics Laboratory, The Johns Hopkins University, Silver Spring, Md.

MEETINGS

Dec. 2-4—Annual meeting of the Society for Experimental Stress Analysis, Hotel Commodore, New York, N. Y.

Dec. 3—Meeting Forest Products Research Society, Virginia-Carolinas Section, at High Point, N. C. Open to non-members as well as members. Theme "The Control of Quality—Does it Pay?"

Dec. 9—Meeting of the Chemical Market Research Association, at Toronto, Ont., Can. Meetings during the coming year will be held Feb. 10 at New York, N. Y.; April 7 at St. Louis, Mo.; and June 9, annual business meeting, at New York City.

Jan. 19-21 — Annual National Technical Conference, Society of Plastics Engineers, Inc., Hotel Bellevue-Stratford, Philadelphia, Pa.

Feb. 15-16—Annual Conference, The Society of the Plastics Industry (Canada) Inc., Niagara Falls, Ont.

Feb. 28-March 4—Spring meeting and Committee Week of the American Society for Testing Materials at Hotel Edgewater Beach, Chicago, Ill. Annual meeting will be held June 27 to July 1, inc., at Chalfonte-Haddon Hall, Atlantic City, N. J.

May 10-13—18th Annual National Packaging Exposition in the Public Auditorium, Atlantic City, N. J. Annual 4-day American Management Association Conference on Packaging, Packing and Shipping will be held in the Auditorium May 10-13, concurrent with Exposition.

Jan. 12-14—Fourth Annual Technical Session of the Reinforced Plastics Div., The Society of The Plastics Industry, Inc., Edgewater Beach Hotel, Chicago, Ill.

All classified advertisements payable in advance of publication. Rates: $5.00 up to sixty words; enclosed in border, $10.00 per inch.

Classified Advertisements

For further information address Classified Advertising Department, MODERN PLASTICS, 122 East 42nd Street, New York 17, New York

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Brooklyn, N. Y. Tel ULster 5-3887

FOR SALE Hydro Pneumatic Accumulator, 13 Gal. 3500#. Ball & Jewell Rotary Cutter. Model B and "T" Stokes Tablet Machines. 50 Ton Press with 18" x 18" Electric Plates. 100 ton 20" x 20" press. Racine Pumps, Boosters, Valves, Logan Pumps, Valves. Self-Contained—200 H.P. 75 Gal. 3000# Pump. 200 H.P. 200 Gal. 1500# Pump 18" x 15', Accumulator 1500#.—15" x 11' Acc. 400-2000". 6" x 9' Accumulator-2000#. 300 Ton Press 20" Ram, 8" Stroke, 24" x 20" Platen. 500 Ton—1000 Ton Hobbing Press—Hele Shaw Variable Pressure 33 GPM 2500#—Vickers Oil Pumps 17 GPM 500 to 1000#. Elmes Horo. 4 Plunger 6—Gals. 5000#. Stillman 12" x 12" Laboratory Presses. Aaron Machinery Co., 45 Crosby St., NYC.

HYDRAULIC PRESSES BUILT to specifications for Plastic Items. Record Presses, producing two per min. We have in the used equipment (1) 1000 ton 30 x 30, 20" ram, 14" stroke, 24" day-light $1800. (1) 600 ton 40 x 48, 18" ram, 36" stroke, 12' day-light $2200. (1) 500 ton 22 x 48, 18" ram, 24" stroke, $1800. (1) 400 ton 22 x 30, 16" ram, 12" stroke, day-light 36" $1500. (2) 200 ton, 48 x 46, 12" ram, 36" stroke, 48" day-light $1200 each (2) 30 ton, 11-½ x 11-½, 10" ram, 10" stroke, 3 post downward acting self-contained $1000.00 each. Sal's Press, 386-390 Warren Street, Brooklyn 2, New York. MAin 4-7847.

VINYL RESIN PROCESSOR

Export department of plastics material manufacturing concern is looking for a vinyl resin processor who will furnish vinyl molding and extrusion compounds on a continuous basis. Box C760 Modern Plastics

IF YOU HAVE GOOD HYDRAULIC PRESSES with modern pumping equipment for sale send me your specifications of same with photo, and I will see to it that you will get the best price available. Sal's Press, 386-390 Warren Street, Brooklyn 2, N. Y., MAin 4-7847.

APPROXIMATE LOT of 300 or more hand-engraved Steel Hubs in assorted sizes, shapes and patterns. Some styles in size range. All patterns suitable for plastic moulding of buttons or jewelry. No reasonable offer will be refused. Art Novelty Mfg. Co., 12 E. 22 St., NYC.

FOR SALE: Thropp 16" x 36" 2 Roll Rubber Mill; Royle #2 Perfected Extruder; 500 ton Hydr. Molding Press 42" x 48"; Field 500 ton 28" x 30"; Francis 200 tons; 24" x 18". Albert 100 Ton, 2 opening, 24" x 24". Also presses 20 to 250 tons from 12" x 12" to 36" x 36" & 40 ton Broaching Press. Watson-Stillman Hor. 4 plgr. 1"x2" x 4" H. & L. Pressure Pumps; HPM 1¾" x 6"; vertical triplex 10 GPM 2700 lbs.; 7 Hydr. Oil Pumps, Vickers, Oilgear, Northern, etc., Elmes 1" x 4" & 1¼" x 4" hor. 4 plgr. 5 to 8 GPM 4500 lbs. & 5500 lbs., Elmes 2" x 6" hor. 30 GPM, 2500 PSI.; Rumsey 4½" x 8" vert. Triplex 65 GPM 900 lbs.; Elmes 2½" x 4" hor. 17 GPM 850 lbs.; Hydr. Steam Pumps; Low Pressure Pumps 150 to 600 lbs. Hydr. Accum.; Stokes type 200 Automatic Molding Press, Stokes Rotary Preform Tablet Machines 1-3/16" 1¼" and ⅝", also single punch; Injection Molding Machines 2 oz. to 12 oz.; Baker Perkins jacketed Mixers 200, 100, 50, 20, 9 & 0.7 gals. capacity; New and used Rotary Cutters; Rubber Mills; Calenders, Banbury Mixers, etc.; Heavy duty Mixers; Grinders; Pulverizers; Gas Boilers, etc. PARTIAL LISTING. WE BUY YOUR USED MACHINERY. STEIN EQUIPMENT CO., 90 WEST ST., N. Y. 6, N. Y. WOrth 2-5745.

LINES WANTED Sales Representative, New York, specializing in 5¢ to $1.00 items for big Chain Stores and Jobbers, desires to contact manufacturers or molders of Plastic Specialties, Housewares, Toys, Notions, Stationery or Novelties. Backed by 20 years' experience and an extensive following. I can assure you of volume distribution. Commission basis. Reply Box C724, Modern Plastics.

WANTED: MOLDS (all items) and Machines: Injection, Transfer, Extruding. Can act quickly and pay cash if you describe fully naming: Maker, Serial Number, Age, Condition, Capacity, Where seen, Lowest Price, and also Wt. of molded part or picture of piece from molds. Are samples available? Reply Box C733, Modern Plastics.

WISH TO CONTACT Plastic mold maker qualified and equipped to make sun glass molds. Reply Box #C771, Modern Plastics.

INDUSTRIAL DESIGNER—Stylist with creative ability, experienced in production and product development in compression and injection molding, sheet forming and casting resins, desires connection with molder, fabricator or progressive manufacturer of products in which plastics play an important part. Free lance or part time basis. Chicago area preferred. Reply Box C744, Modern Plastics.

SAVE WITH GUARANTEED REBUILT EQUIPMENT: Hydraulic Presses 30"x30" 24" ram, 700 tons, 30"x30" 20" ram, 1000 tons, 30"x30" 20" ram, 393 tons, 20"x24" 19" ram, 350 tons, 36"x36" 19" ram, 425 tons, 24"x24" 18" ram, 382 tons, 30"x30" 17" ram, 340 tons, 42"x42" 16" ram, 250 tons, 46"x52" 14" ram, 385 tons, 36"x36" 12" ram, 141 tons, 24"x26" 10" ram, 118 tons, 20"x20" 10" ram, 118 tons, 19"x24" 10" ram, 78 tons, 23"x17" 8" ram, 75 tons, 22"x15" 8" ram, 75 tons, 15"x15" 8" ram, 75 tons, 12"x12" 7½" ram, 50 tons, 12"x12" 6½" ram, 42 tons, 8"x8½" 4½" ram, 20 tons, 16"x16" 3½" ram, 12 tons; Pumps Robertson Duplex 1-2/3 gal. 4000#, Worthington Triplex 12 gal. 2200#, Watson Stillman Duplex box 1 gal. 2500#, 4 plunger 6 gal. 2000#; Laboratory Presses, all sizes; New Laboratory 6"x12" M.D. Mills; Extruders, Plastic NRM 1½" and 2½" Units; Preform Machines, Stokes R, Colton 5 and 5½ T; Mills, Mixers, Accumulators, Vulcanizers, etc. NEW DUAL PUMPING UNITS ALL SIZES. Highest prices paid for your used machinery. UNIVERSAL HYDRAULIC MACHINERY COMPANY, 285 Hudson Street, NYC, 13.

CHEMIST AVAILABLE
COATINGS—LAMINATIONS—IMPREGNATIONS—ADHESIVES

Consulting Technical Director of leading company for the past seven years will be available shortly due to reorganization. Textiles, papers and metals. Rubbers, resins, lacquers and colors. Production or Development.
Metropolitan New York only.
Reply Box C736, Modern Plastics.

WANTED TOYS AND HOUSEWARES LINE by well rated experienced sales representative, New York office and showroom, with excellent following among syndicate chains, jobbers and exporters. Manufacturer must have good organization and volume facilities. Commission basis. Present nationally known items carried will not conflict with plastics line. Reply Box C754, Modern Plastics.

THERMOPLASTIC SCRAP wanted, Polystyrene, Cellulose Acetate or Vinyl. Scrap or rejects in any form. Surplus lots purchased. Highest Prices. Box C757, Modern Plastics.

WANTED: PLASTIC Scrap or Rejects in any form, Cellulose Acetate, Butyrate, Polystyrene, Acrylic, Vinyl Resin, etc. Also wanted surplus lots of phenolic and urea molding materials. Custom grinding and magnetizing. Reply Box 318, Modern Plastics.

THE FERNELL CO.

Now offers permanent sales representation in the Metropolitan New York Area to Western and West Coast Molders, Extruders and Fabricators. Write The Fernell Co., 342 5th Ave., New York 19, New York (RM 70).

A LARGE INJECTION MOLDER has open time on 4, 6 and 8 oz. Reed Prentice and Lester and 16 oz. HPM, 16 and 22 oz. IPM injection machines—operations on 3 shift basis and maintains own tool shop. Reply Box C785 Modern Plastics.

SALES REPRESENTATIVE WANTED: Completely equipped Mid-Western plastic fabricator desires to contact salesmen able to produce volume business. Our modern equipment and extensive experience qualify us to back up the sales effort of the right men with first class production in an efficient and economical manner. Restricted territories. Replies confidential. Box C789 Modern Plastics.

FOR SALE

SCRAP—Cellulose Acetate (reclaimed film) clear, trimmings and mutilated sheets.
SHEETS—Cellulose Acetate, clear and colored, .0075" gauge. First class reclaimed stock.
Write for samples and quotations.
Plastofilm, Inc., Wheaton, Illinois.

MANUFACTURING PLANT—Plastic Molding and Laminating—Over $75,000 in equipment and inventory. Capable of $1,000,000 annual production. 11 Presses 75 tons to 500 tons. Located St. Louis, Missouri. Owner retiring. Will finance up to 50 per cent for responsible firm or individuals. Reply Box C790, Modern Plastics.

WANTED—Used VanDorn one ounce injection molding press. Must be in good working condition. Prefer vicinity New York City to facilitate inspection. State best price. Reply Box C791 Modern Plastics.

(Continued on page 200)

YOURS, FREE....

● A NEW STUDY OF THE $5 BILLION PACKAGING MARKET

to help you plan your selling and advertising

PACKAGING IS BIG BUSINESS

The Department of Commerce in June, 1947, rated the design, testing, production, shipping and merchandising of packages as a five billion dollar business. Considered as a separate industry, packaging rates as one of the largest in the country — larger than steel and machinery, larger than the automobile industry at its 1939 level. And its volume is increasing as more products find their way into packages and more labor-saving packaging machinery goes on the production line.

AN ACTIVE, FLUID MARKET

Faced with increasing competition and shrinking profit margins, manufacturers are closely scrutinizing packaging materials, methods and equipment. They are eagerly searching for ways to cut production, distribution and sales costs, and improve the style, sales appeal, product protection, brand identification and take-home-value of their packages.

Always a fluid market, the packaging industry is in a ferment of change as products move from one type of container to another. Packaging's basic forms—the metal can, glass jar, paper wrap and boxboard carton — have all been improved. New materials, and some old ones that were never used in packaging before, have made inroads in the market—materials like aluminum, plastic films and fibers to name but a few. And these changes in material often mean a change in equipment all along the line.

ADDITIONAL MARKET DATA COMING

Modern Packaging presents this study as the first part of a complete and continuing analysis of this lucrative and growing market. Future data sheets and studies will contain current statistics and further information on how the industry buys, what it buys, and how it is organized—all designed to help you evaluate your product in terms of this market and to help you plan your advertising and selling to it. You'll find these sheets easy to file in the handy file folder the first study comes in.

"MUST" READING FOR SALES-MINDED EXECUTIVES

Get your name on the mailing list for this complete analysis by reserving your copy of the study now. Just tear out and send us the attached coupon.

32 PAGES OF ILLUSTRATIONS, CHARTS AND TEXT CONTAIN CHAPTERS ON:

- Size of Packaging Market
- Industries That Comprise the Field
- What the Packaging Field Buys —
  - Materials and Supplies
  - Containers
  - Machinery and Equipment
  - Services
- Buying Influences
- Why Packaging Is a Horizontal Market
- Growth of the Packaging Field
- How Various Company Departments Influence Buying

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Please send me, without obligation, my free copy of "The Packaging Market and How to Reach it."

Name.....

Position.....

Company.....

Products.....

Street.....

City..... Zone..... State.....

MPL-12

Modern packaging MAGAZINE

122 East 42nd Street, New York 17, N. Y.

(Continued from page 198)

FOR SALE:—1½" diameter screw type extrusion machine, standard Royle screw, cylinder and gear housing, complete with motor drive, 110 volt AC. All heat controls, water cooling attachment, self-contained on stand, complete, ready to plug in and operate. Price—$750.00. Extruded Plastics, Inc., New Canaan Avenue, Norwalk, Conn.

VINYL PLASTIC SHEETING 54" 6 gauge translucent Pink & Green, about 100 yds. each. 4 gauge opaque about 700 yds. each grey, brown, beige. Swatches on request. Will accept reasonable offer, subject to prior sale. Reply Box C773.

WANTED 48 x 96 — 10 opening Laminated Molding or Veneer Press, 6¼ minute cure, 400# psi, complete with pump, etc. Reply Standard Machinery Company, Grand Rapids 4, Michigan.

FOR SALE injection mold for tested kitchen gadget. Excellent premium. Mold suited for any 8 oz. mold. mach. Well built, priced right. Reply Box C774 Modern Plastics.

FOR SALE: brand new injection type Molds. One 6-cavity combination special designed beautiful Soap-Box, one 6-cavity Soap-Dish, one 4-cavity novelty item and one 4-cavity tumbler Mold as well as several other molds. All Molds to fit the 8-ounce Reed-Prentice or any other injection machine. Molds are brand new and in perfect working condition for immediate possession. Reply Box C775, Modern Plastics.

MOLDS, NEW OR USED, for 2 oz. and 8 oz. injection molding machines. Interested in all types of articles such as umbrella handles, wrist bands, watch straps, combs, tooth brushes. Give full particulars, price. Reply Box C776 Modern Plastics.

GUARANTEED REBUILT EQUIPMENT

Baker-Perkins Heavy Duty 100 gallon Double Arm, Steam Jacketed Mixers.

Readco Heavy Duty 150 gallon Double Arm, Steam Jacketed Mixers.

Stokes and Colton Rotary Tablet Machines.

Mikro 24", 18H, Bantam Pulverizers.

Mixers of all types, Dryers, Grinders, Automatic Cellophane Wrappers.

Immediate Delivery at Tremendous Savings.—Union Standard Equipment Company, 320 Lafayette Street, New York 12, N. Y.

SUBSTANTIAL SAVINGS ON PRODUCTION TOOLS made of thermoplastics. Drop-hammer punches, hydro-press forming dies, drill jigs, checking fixtures and duplicator masters are among the many tools which can be made of thermoplastics. Representation wanted in exclusive territories. Liberal commission plan. No competition in an unlimited field. For complete information contact Box C777, Modern Plastics.

PLASTICS EXTRUDERS—We need several experienced thermal plastic extrusion operators for positions of Set-up and Die Development. Reply giving experience and salary required. Location Midwest. Reply Box C778 Modern Plastics.

WANTED

SALES ENGINEER
TO HEAD CUSTOM MOLDING
SALES DEPARTMENT

We are well established in Southeastern territory where rich markets are virtually untouched. A plastics sales engineer who knows compression and injection molding THOROUGHLY will find here an opportunity to build a satisfying future.

If your record of past performance will justify demands for a substantial salary plus percentage, we would like to talk with you personally. An interview may be arranged by writing direct to: Personnel Manager, Custom Molding Division, The Patent Button Company of Tennessee, Inc., Knoxville 8, Tennessee.

WANTED—Sales engineer for Chicago area to represent a well established firm of plastic mold makers located in the east. Must be familiar with the plastic molding industry. Reply Box C779 Modern Plastics.

PLASTIC LABORATORY EQUIPMENT FOR SALE

One—practically new Hydraulic Press Mfg. Co.—200-ton hydraulic press—bed 30 x 24 — stroke 12" — Daylight between grids 30" plus 3 phase motor and starter—220 volt.

One—Walk-in Type Storage Cooler, 6'x6'x7' complete with humidifying and cooling apparatus.

One—H. K. Porter Company Roller Jar Mill #4, equipped with 1/3 h.p. standard open 220 volt, 60 cycle, 3 phase, right angle gear motor. Rollers are 4' 9" long, rubber covered with SKF roller bearings. Mills suitable to handle four—1 gallon wet grinding capacity jars with 50% porcelain ball charge, complete with porcelain roller mill jars and porcelain balls.

One—Mixing Equipment Company S-2 Lightning Portable Mixer—½ H.P.—220 volt—direct driven—totally enclosed fan cooled motor, 60 cycle—3 phase.

One—Devilbiss Company UBP 5014-3 Air Compressor—220 volts—3 phase, 60 cycle—28.4 CFM displacement.

One—Plastics Manufacturers, Inc. #200—5 H.P. Steam Boiler.

Purchasing Dept., LYON METAL PRODUCTS, INC., AURORA, ILL.

WANTED TO BUY or lease HPM Injection Molding Machines, 2 ounce, 4 ounce, 9 ounce capacity. Reply Box C780, Modern Plastics.

EXECUTIVE — PLANT ENGINEER OR MANAGER 10 years' experience, graduate engineer. Thoroughly experienced injection molding, extrusion, blowing, forming, compounding, scrap reclamation, product development, mold design and construction, development of machines, processes, methods, materials; maintenance, plant set-up, layout, production, cost, technical sales. Creative, aggressive, reliable. Fine record of accomplishments. Desires connection with sound, progressive firm. Reply Box C781, Modern Plastics.

POSITION WANTED

As superintendent of injection molding plant. College graduate, veteran, Plastics Industries Technical Institute graduate (resident course), 33, married, has thorough knowledge of latest Reed-Prentice machines (10 D series). Now holds responsible position with West Coast molding firm. Address replies to Box C788 Modern Plastics.

WANTED:—Hydraulic Presses 14" to 36" rams, steel cylinders preferred. Reply Box C782 Modern Plastics.

WANTED—Formula and complete manufacturing information for producing casting resins. Please write to CIA. GERAL DE EMPREENDIMENTOS c/o MR. LEO BERKOWITZ, Avenida Antonio Carlos 207, Sala 402 A, Rio de Janeiro, Brazil.

PLASTIC MOLDING PRESSES

Practically new 300 ton capacity Stokes Toggle Press. Machine #441. Serial # 3109-A. Entirely self-contained including all necessary power units, controls, and etc. This machine is ready to operate upon installation. It is a "steal" at $6,000.00 F.O.B. Omaha, Nebraska.

One only HPM Hydraulic Press 75 ton capacity. Serial # 21214. Line pressure 2,500 pounds per square inch. Maximum ram travel 12 inches. Entirely self contained with all motors, pumps, controls, and etc. This is a downward acting press which is also suitable for the manufacture of salt blocks, tile, cement blocks, as well as plastics. It is yours for $3,000.00 F.O.B. Omaha, Nebraska.

The above presses may be seen at our plant or full detailed information will be forwarded to any interested reader. Phone Omaha, Nebraska KENWOOD 0031.

U. S. BRUSH COMPANY OF OMAHA
4301 NORTH 28TH STREET
OMAHA, NEBRASKA

FOR SALE: 20,000 Ivory single toggle switch plates. Company has discontinued line and will sell at considerably below production costs. Ideal item for export. Reply Box C783 Modern Plastics.

WANTED—A CAPABLE INJECTION ROOM FOREMAN by large New England Injection Molder. State full qualifications, experience and salary expected. Reply Box C784 Modern Plastics.

WANTED: PLASTICS CHEMIST AND ENGINEER to act as Instructor and Manager for rapidly growing school and Laboratory on East Central Coast. Excellent opportunity for ambitious man with business acumen as well as technical ability. Starting salary $5,000 per year. In replying list references. Reply Box C786 Modern Plastics.

FOR SALE:—1 (one) new Westinghouse Standard 2 K.W. H-F Oscillator Radio Frequency Generator for heating dielectric materials. Operates in 5, 15, and 30 M.C. Price $1,500.00. 1 (one) Lupomatic Tumbler, Model #103L, 3 barrels, wood lined, all enclosed. Complete including motor. Price $300.00. Reply Box C787 Modern Plastics.

PEGS—SAWDUST
TRIPOLI—TUMBLING MIXTURES
New Tumbling Sawdust mixtures. It has more cutting qualities than the ordinary grades.
SQUARE KUT PEGS—TRIPOLI—ITALIAN PUMICE
Write for Particulars—National Sawdust Co., Inc., 82 N. 6th St., Brooklyn, N. Y.

WE ASSEMBLE—FINISH—PACK & SHIP and do any kind of contracting work on your plastic mass products. Quick & Reliable. Reply Box C 792 Modern Plastics.

"TEFLON" DEVELOPMENT ENGINEER
Experienced in all phases of polytetrafluorethylene (Teflon) fabrication and die design for both batch and extrusion processes. Can assume full responsibility for all phases of die design, development, and production of the final product. Would consider either consulting or full-time capacity. Graduate Ch. Eng. Reply Box C793 Modern Plastics.

For those who may not have had the opportunity of visiting the recent National Plastics Exposition at Grand Central Palace in New York, we are presenting a photograph of our display booth.

Our exhibit featured an array of injection molded, decorative plastic products produced for nationally known firms, such as. Westinghouse Electric, Motorola, Inc., Zenith Radio, Plymouth, Dodge, Chevrolet and Cadillac Automobiles, Caterpillar Tractor, Roma Wine, Schlitz Brewery, R. C. A., Stewart-Warner, Olympic Radio and others.

The Cruver "experience" of 52 years is at your service; inquiries are invited, they will receive the prompt attention of our engineering staff.

CRUVER MFG. CO.

Est. 1896

MOLDING • FABRICATING • LAMINATING • FINISHING
"BAS-RELEEF" • DECORATING • ASSEMBLY • SPRAYING

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NEW YORK 2 West 46th Street | DETROIT General Motors Building | ST. LOUIS Cotton Belt Building

MODERN PLASTICS ADVERTISERS

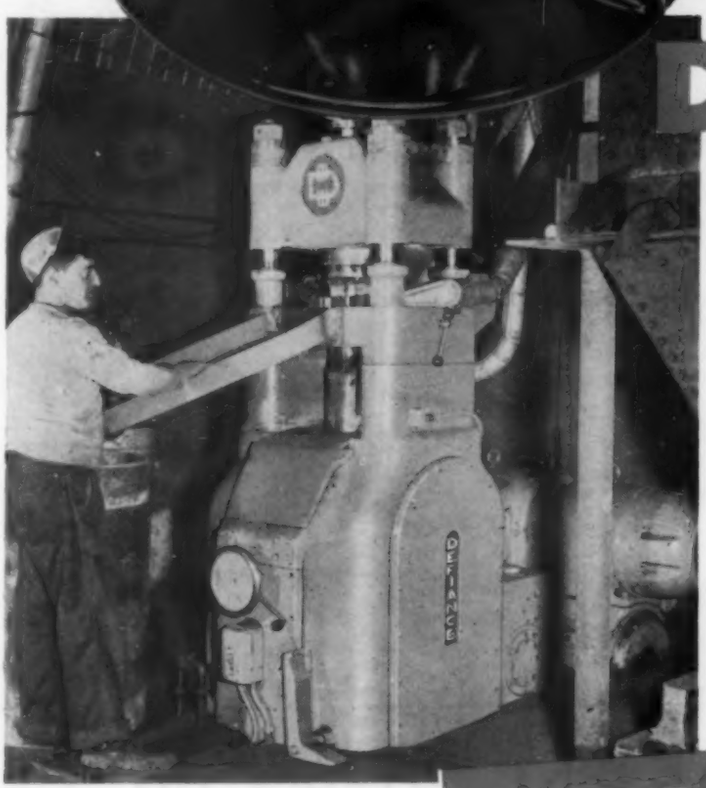
DECEMBER, 1948

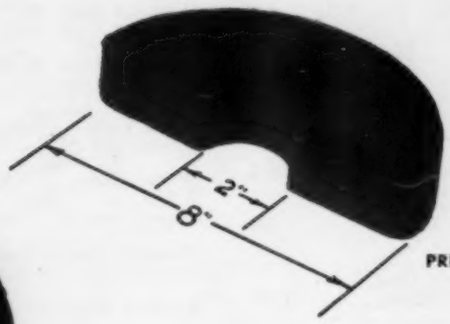
(Please turn to page 204)

AGITATOR PREFORM PRODUCTION

Increased 790%

FINISHED WASHING MACHINE AGITATOR





PREFORM

...WITH DEFIANCE PREFORM PRESS

Modern Plastics Corp. of Benton Harbor, Mich. now makes preforms for 1250 washing machine agitators per hour instead of 140—a *790% increase in production* with a Defiance No. 45 Preform Press!

Formerly, the agitators were molded from a single 8" diameter doughnut-shaped preform made on a hydraulic press. With the Defiance, two semi-circular preforms are used—each weighing 1½ lb. The No. 45 supplies more preforms in one hour than the old method produced in an 8 hour shift! It empties a 220 lb. drum of material every 3¾ minutes—or 3520 lb. per hour.

Let Defiance help you with your preform problems . . . increase production . . . reduce costs. Write concerning Preform Presses No. 45 with 200 ton capacity; No. 20 with 75 ton capacity; and new No. 153 Tri-Dyne Molding Press. Defiance Machine Works, Inc., 2325 Madison Avenue, Toledo 2, Ohio.

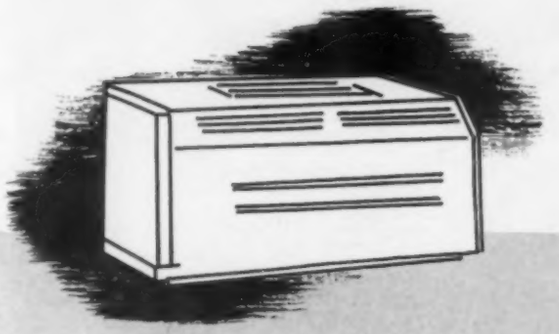
98 Years of Precision Manufacturing

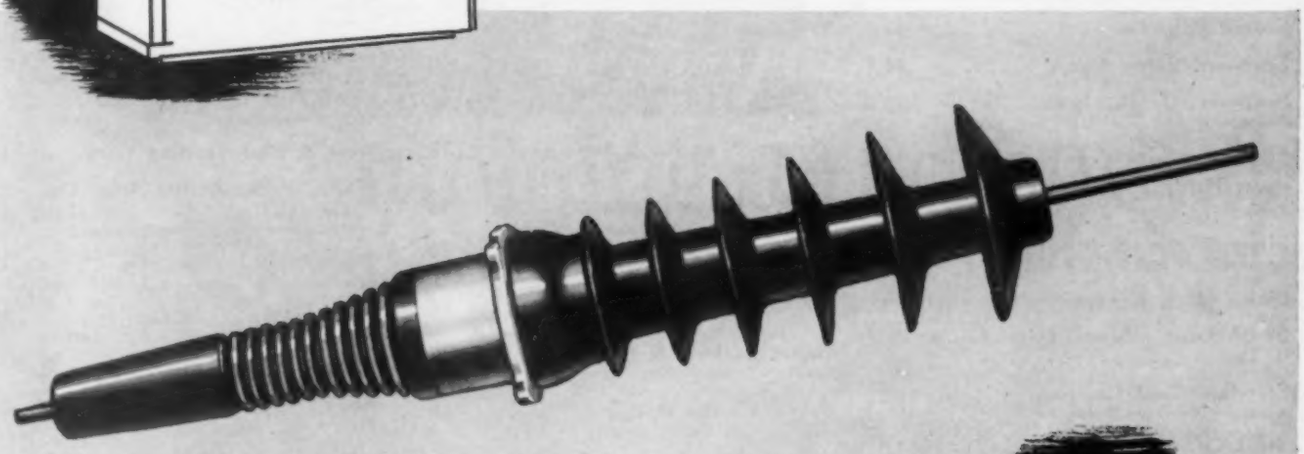
DEFIANCE
PLASTIC PRESSES

(*Continued from page 202*)

(*Please turn to page 206*)

Attention: *Manufacturers of TELEVISION SETS PHONOGRAPHS AIR CONDITIONERS APPLIANCES*





Insulator over 5 feet long and 56 pounds in weight, molded by Insulation Manufacturing Co., Inc.

Your cabinet or housing can be perfectly reproduced in plastic . . . in quantity . . . with tools and equipment specifically designed by Insulation for large-sized moldings.

Economies ranging as high as 400% and sales increases of 126% have resulted by switching to plastic moldings by Insulation.

Consultations can be easily arranged anywhere. No obligation, of course.

•

Size is no object at Insulation!

•

INSULATION MANUFACTURING CO., INC.

Custom Molders of Plastics for Industry

13 New York Avenue • Brooklyn 16, N. Y.

(Continued from page 204)

Here is new... molding efficiency..!

Another prominent plastics molder tells about the premium performance of

THERMALL

ELECTRONIC HEAT GENERATORS

Illustrated is a THERMALL CHIEF a loading board preheater. On this job it is being used as a general purpose preheater. This is an example of the flexibility of THERMALL preheating equipment.

THERMALL CHIEF
Width ..... 28"
Depth ..... 21"
Height (Work Level)..39"
Heat Capacity..... 1½ lbs. (per minute)

TECH-ART PLASTICS COMPANY

36th Ave. and 41st Street • LONG ISLAND CITY, N. Y. • Tel. Alstoria 8-6050-1
SUCCESSORS TO BOONTON RUBBER MANUFACTURING COMPANY

MOLDERS OF THE ABOVE RADIO CABINET

WRITE:

"THERMALL High Frequency Preheating reduced the molding cycle for a 6½ pound radio cabinet from six minutes to 3½ minutes. A tremendous improvement in the flow characteristics was noted. This resulted in a uniform mahogany and walnut grain throughout the cabinet. THERMALL preheating also permitted the use of standard material rather than a "special" formulation.

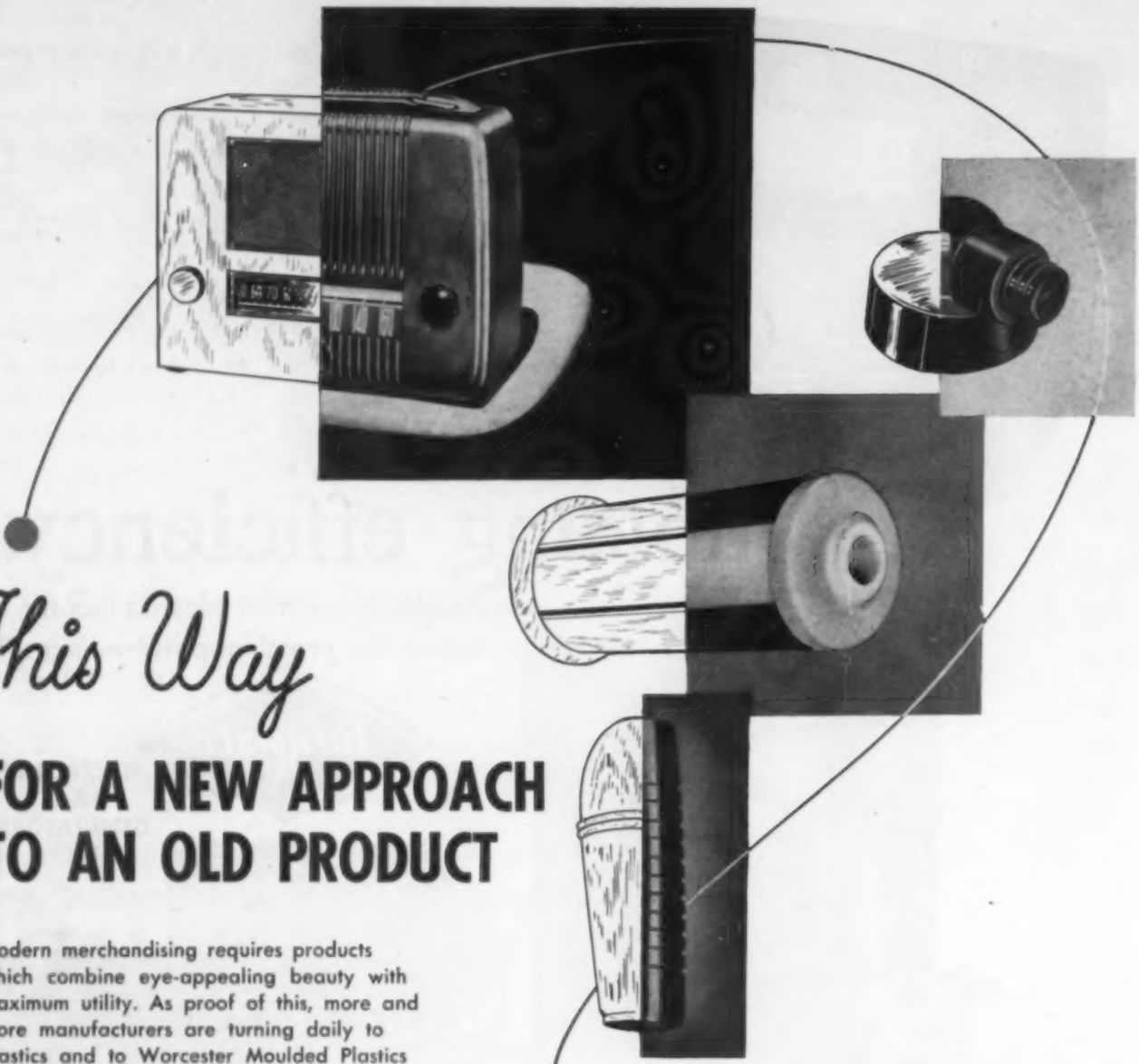
Another result in the use of the THERMALL unit was the improved overall surface finish which increases the sales appeal of the finished product."

It will pay you to look into the many THERMALL advantages that enable you to produce superior plastic moldings.

For information on the advantages, and uses or for demonstration any where in the world, write

W. T. LaROSE & ASSOCIATES, INC.
TROY, NEW YORK, U. S. A.

GUARANTEED PERFORMANCE . . . *or it doesn't cost you a cent!*



This Way

FOR A NEW APPROACH TO AN OLD PRODUCT

Modern merchandising requires products which combine eye-appealing beauty with maximum utility. As proof of this, more and more manufacturers are turning daily to plastics and to Worcester Moulded Plastics Company for a revamping of their old products or a plastics approach to a new one. Our personnel, experienced in all phases of custom injection moulding, accept each assignment as a challenge and concentrate on making every product a plastics success. Since we are neither manufacturers nor merchandisers of any product of our own, our interests center on our customers' products exclusively.

Our designing, engineering, moulding, finishing and inspecting departments offer you complete service in the design and development of plastic parts and products. Perhaps there is an opportunity to make a new approach to some product of yours — a plastics approach. We'd like to help you with that approach.

Custom Injection Moulding

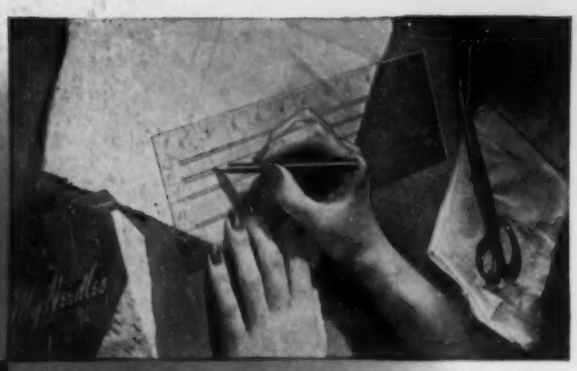
WORCESTER MOULDED PLASTICS CO.

14 HYGEIA STREET, WORCESTER 8, MASS.

17 East 42nd St., New York 17, N. Y.
130 West Chippewa St., Buffalo 2, N. Y.

PRICE-TICKET HOLDERS

COUNTER DISPLAYS



MARKERS—RULERS

RECORDS

ORNAMENTS

RIGID SHEETS—FOR FLEXIBLE MINDS!

Imaginative thinking, with all facts at hand, led to the making of these fine products from VINYLITE Plastic Rigid Sheets!

They have an almost unbelievable *formability,* even for complicated, three-dimensional shapes. They are strong, tough, and stiff, so that parts molded from them are amazingly *stable,* holding their form and dimensions despite exposure to water and changes in weather, most strong acids, alkalis, and other chemicals, as well as to temperatures up to 55 deg. C.

Perfectly registered printing in four or more colors is readily accomplished, and the material also accepts embossing or any etched or intaglio design.

The easy workability of economical VINYLITE Rigid Sheets by simple, unspecialized methods has made them highly favored plastic materials among shop men and design engineers, alike. They come in all colors—or clear. They may be transparent, translucent, or opaque, with a glossy-smooth polished, or matte, surface. They will not support combustion.

Find out more about VINYLITE Plastic Rigid Sheets by writing Department EN-7.

DOLL FACES

- RADIO DIALS
- TRANSPARENT PACKAGES
- PLACE MATS
- AIRPLANE WINDSHIELDS
- ELECTROTYPE MOLDS
- PLAYING CARDS
- ACID-PIPE LABELS

Vinylite BRAND PLASTICS

BAKELITE CORPORATION

BAKELITE CORPORATION, *Unit of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N.Y.

• ENGINEERED IN PLASTICS BY GENERAL ELECTRIC

Bull's-eye for Plastics

• Plastics score a hit in this unusual application! Stocks for the new Hy-Score target pistols are molded in plastics by General Electric for the Hy-Score Arms Corporation, Brooklyn, N.Y. Called the world's most powerful air pistol, the Hy-Score requires a sturdy stock that will stand up under shock, resist perspiration and grease. G. E. selected a plastics that meets these specifications, then molded the stocks in four distinctive color patterns.

What is *your* plastics problem? Whether you sell pistols or perfume, General Electric's *complete* plastics service may help you lower production costs, improve your product. General Electric, world's largest manufacturer of finished plastics parts, is equipped to design, engineer, and mold plastics products to meet your individual requirements.

Write us for more information. Or get in touch with your nearest G-E Sales Office. We'll be glad to consult with you on any plastics job. Meanwhile, write for your free copy of the illustrated color booklet, "Problems and Solutions in Plastics." Address: Plastics Division, Chemical Department, General Electric Company, 1 Plastics Avenue, Pittsfield, Mass.

G-E COMPLETE SERVICE—AT NO. 1 PLASTICS AVENUE

Backed by 54 years of experience. We've been designing and manufacturing plastics products since 1894. General Electric research facilities have expanded continually, working to develop new materials, new processes, new applications for plastics parts.

No. 1 Plastics Avenue—complete plastics service—engineering, design, mold-making. G-E industrial designers work with our engineers to create plastics parts, sound and good looking. Skilled mold-makers in G-E toolrooms average over 13 years experience.

All types of plastics. Compression, injection, transfer and cold mold facilities . . . high and low pressure laminating . . . fabricating. G-E Quality Control—a byword in industry, means as many as 160 inspections and analyses for a single plastics part.

EVERYTHING IN *Plastics*

GENERAL ELECTRIC

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General Electric plastics factories are located in Scranton, Pa., Meriden, Conn., Coshocton, Ohio, Decatur, Ill., Taunton and Pittsfield, Mass.